



# **LOS ANGELES COUNTY EMS STEMI & 12 Lead EKG Education**

**ST Elevation Myocardial Infarction  
Receiving Centers**

# OBJECTIVES

At the conclusion of this class, the student will be able to:

- Cognitive
  - Verbalize understanding of review material (normal heart, EKGs and cardiac circulation)
  - Describe the pathophysiology of a myocardial infarction
  - Verbalize understanding of different treatments of myocardial infarction
  - Discuss the new and revised policies regarding STEMI
  - Describe the necessary steps prior to obtaining a 12-lead EKG

# OBJECTIVES

- Psychomotor
  - Demonstrate 12-lead EKG application
  - Print and read computer interpretation of the 12-lead EKG
  - Identify the appropriate patients to be transported to the SRC
- Affective
  - Empathize with the patient experiencing the STEMI
  - Develop the professional responsibility required for treating and documenting care provided to a STEMI patient

# MORBIDITY & MORTALITY

- Leading cause of death in America
- In 2005, 13 million people had Coronary Artery Disease (CAD)
- 39.4% of all deaths (1 in 2.5 deaths)
- 150,000 Americans killed by CAD are under 65
- An estimated 1.1 million Americans will have new or recurrent coronary attacks this year
- 250,000 die without being hospitalized (sudden cardiac death)

# STEMI Receiving Center (SRC) Rationale

- Goal – Identify patients experiencing a ST-elevation myocardial infarction (STEMI) by using a 12-lead EKG then transporting them quickly to a SRC.
- Purpose – To ensure that 9-1-1 patients with STEMI are transported to a facility with cardiac catheterization/surgical capabilities.

# What are others doing?

- Boston, Minneapolis and Durham were the first EMS agencies to independently begin this type of regionalized care of STEMI patients.
- Boston is one of the first EMS systems to allow paramedics to bypass non-percutaneous cardiac intervention (PCI)-capable hospitals when a STEMI has been triaged in the field.

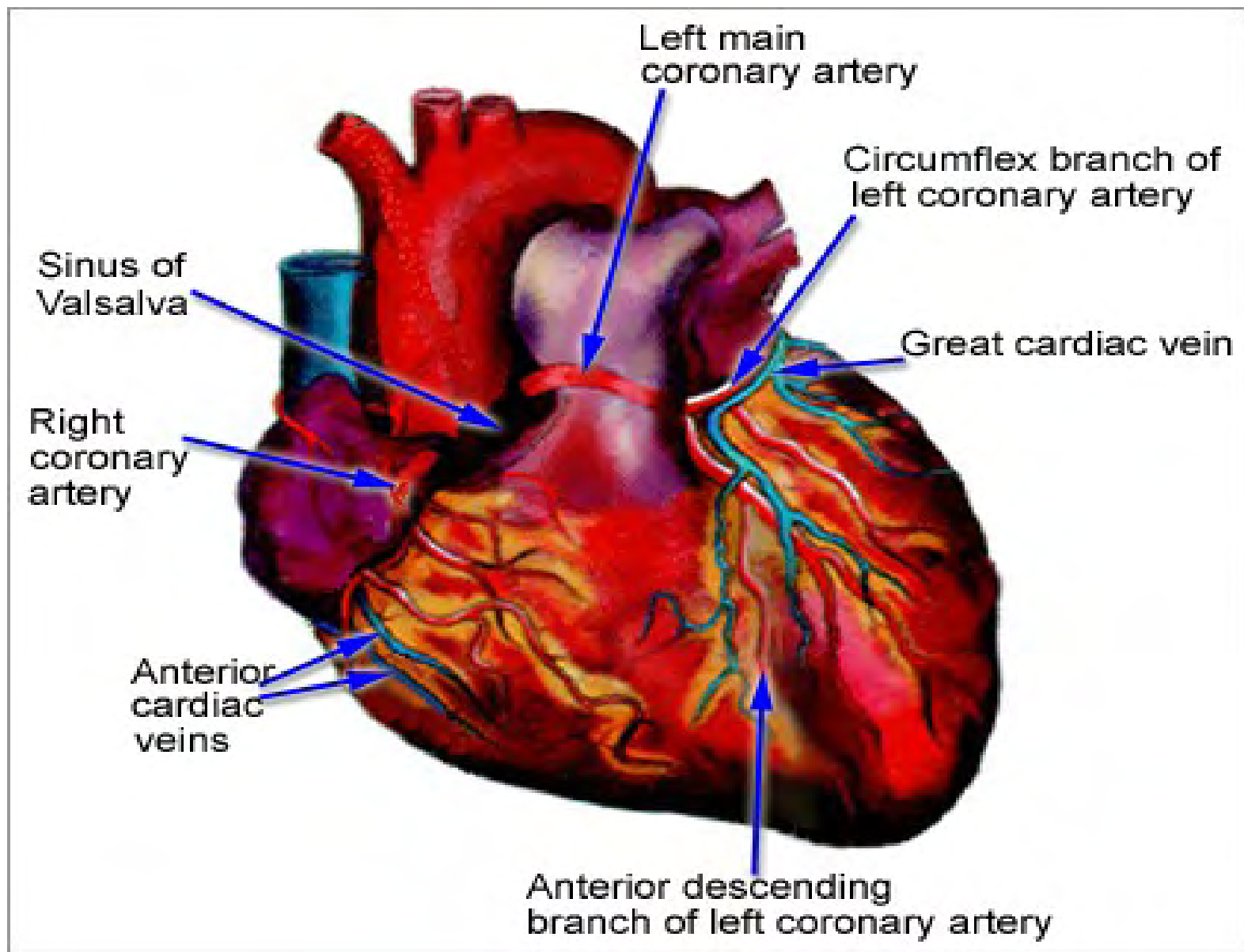
# STEMI Receiving Center (SRC) Rationale

- Similar to Trauma Center designation or EDAP approval.
- SRCs are specialty centers dedicated to providing optimal care to the STEMI patient. The SRCs have specialized equipment and trained staff available 24/7.

# Coronary Circulation Review

- Coronary arteries supply oxygen and nutrients to the heart muscle.
- 1<sup>st</sup> branches off the aorta are the coronary arteries.
  - **R & L** coronary artery branches supply 200-250ml of blood/minute to the heart muscle.
  - **L** coronary artery carries 85% of this volume.

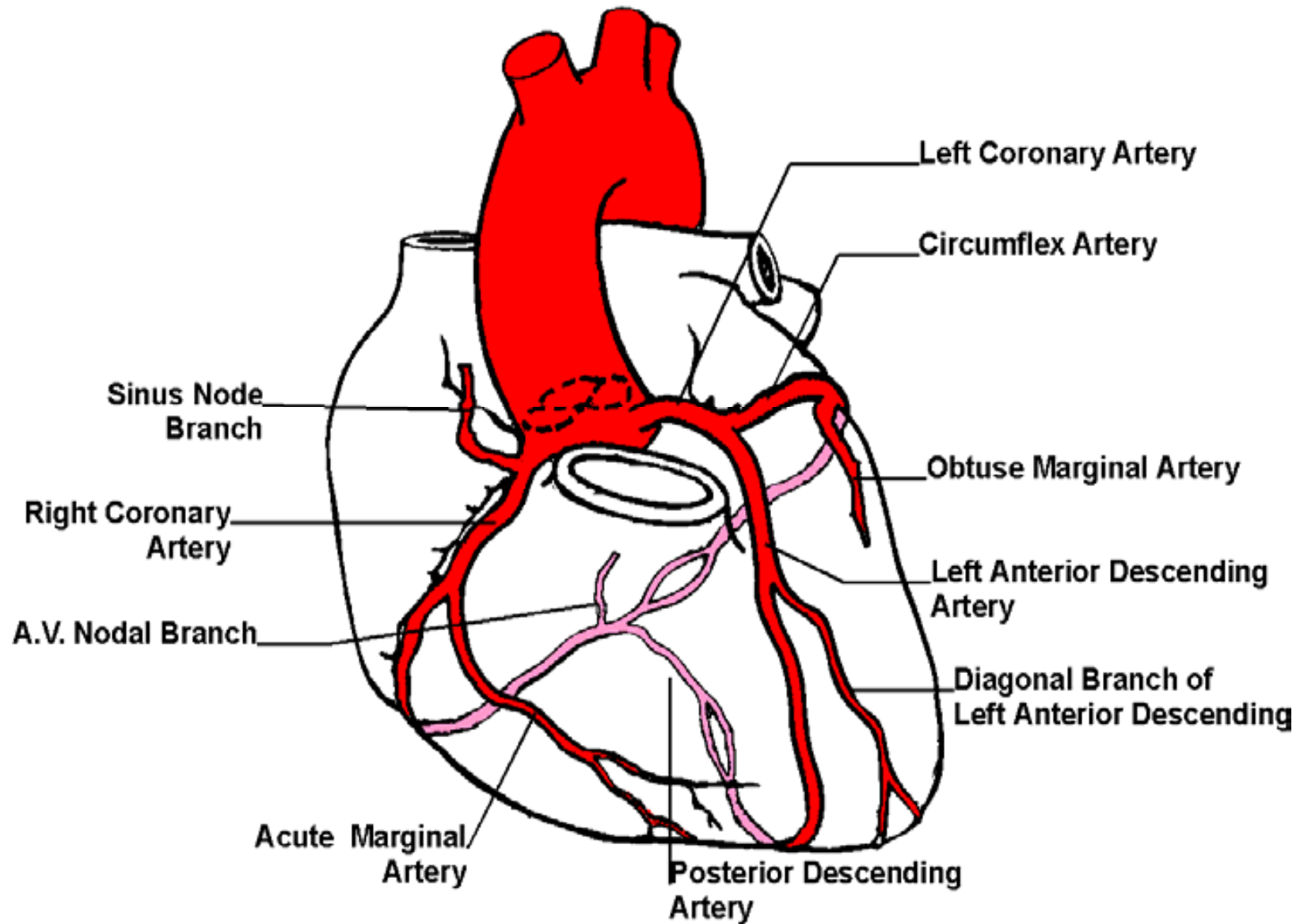




# Coronary Circulation Review

- Myocardial perfusion – occurs during ventricular diastole (at rest).
  - Ventricular systole: no perfusion occurs due to contraction.
  - Ventricular diastole: muscle is relaxed.

# Coronary Arteries

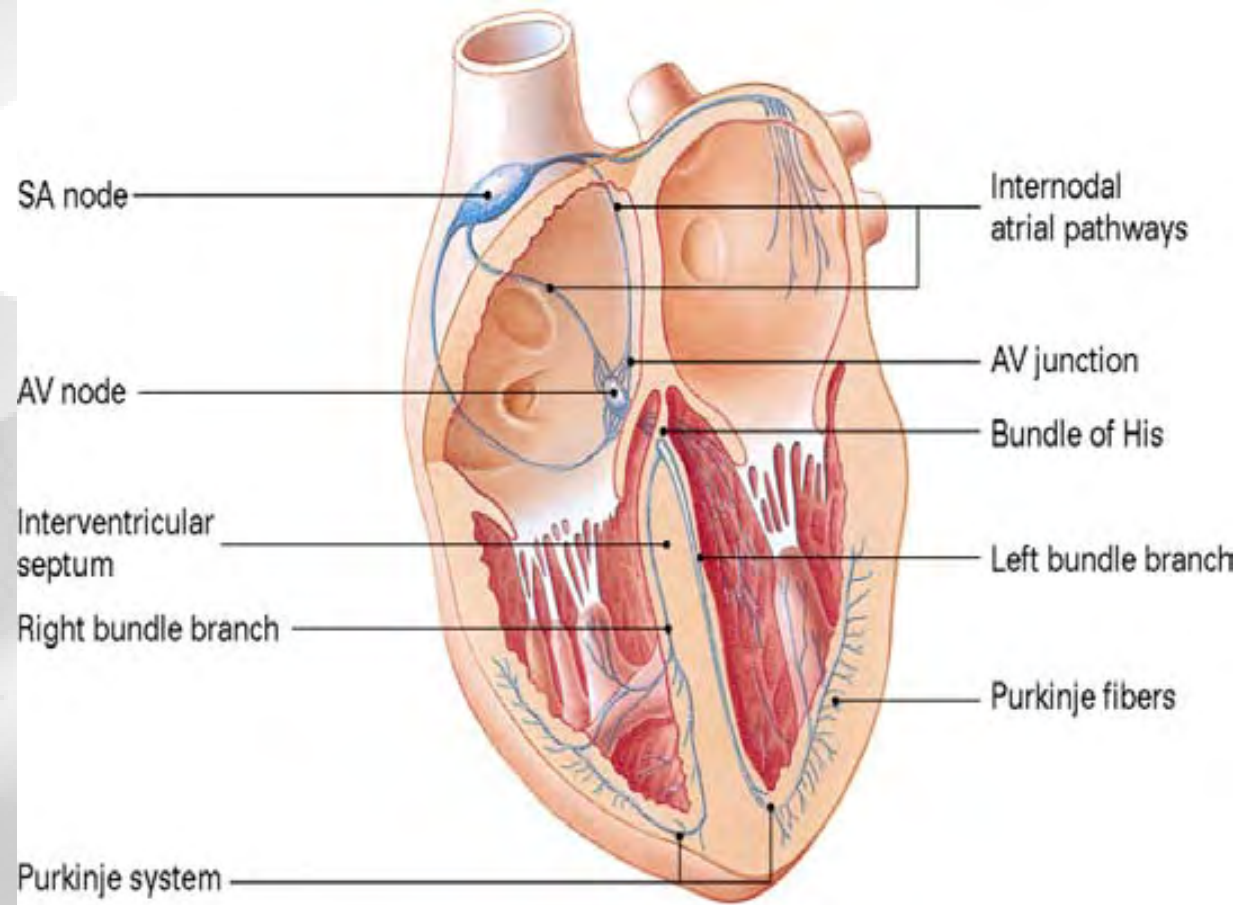


# Coronary Circulation Review

- Coronary veins – drain deoxygenated blood back to the **R** atrium via the coronary sinus.
- Factors affecting coronary perfusion
  - Heart rate: Increased HR causes
    - ↓ filling time
    - ↓ perfusion and
    - ↑ myocardial O<sub>2</sub> demand
  - Blood Pressure: BP must be at 60 systolic for coronary perfusion to occur.

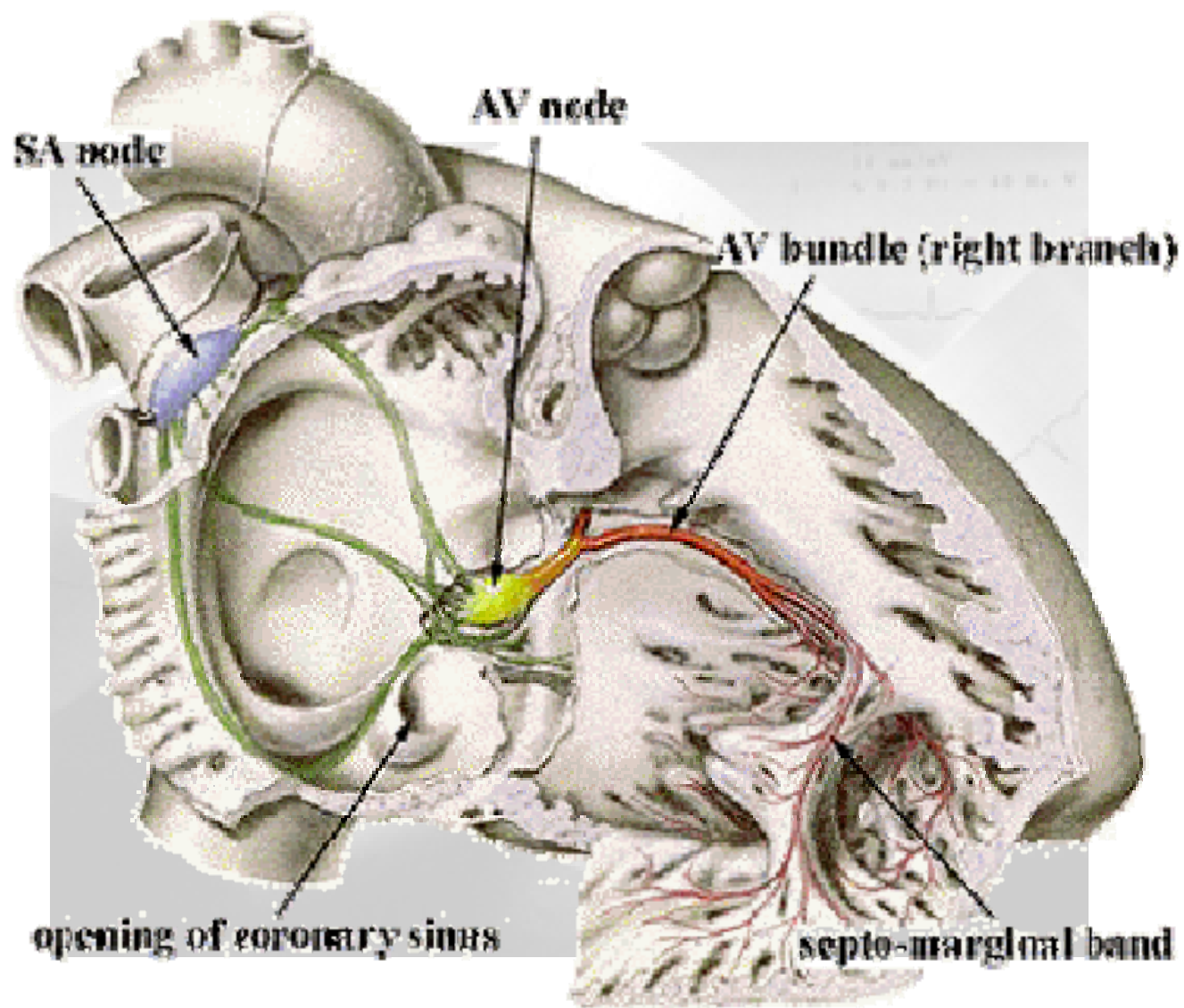
# Conduction System

- SA Node
- Intranodal Tracts
- AV Junction
- Bundle His
- Bundle Branches
- Purkinje Fibers



# Conduction System

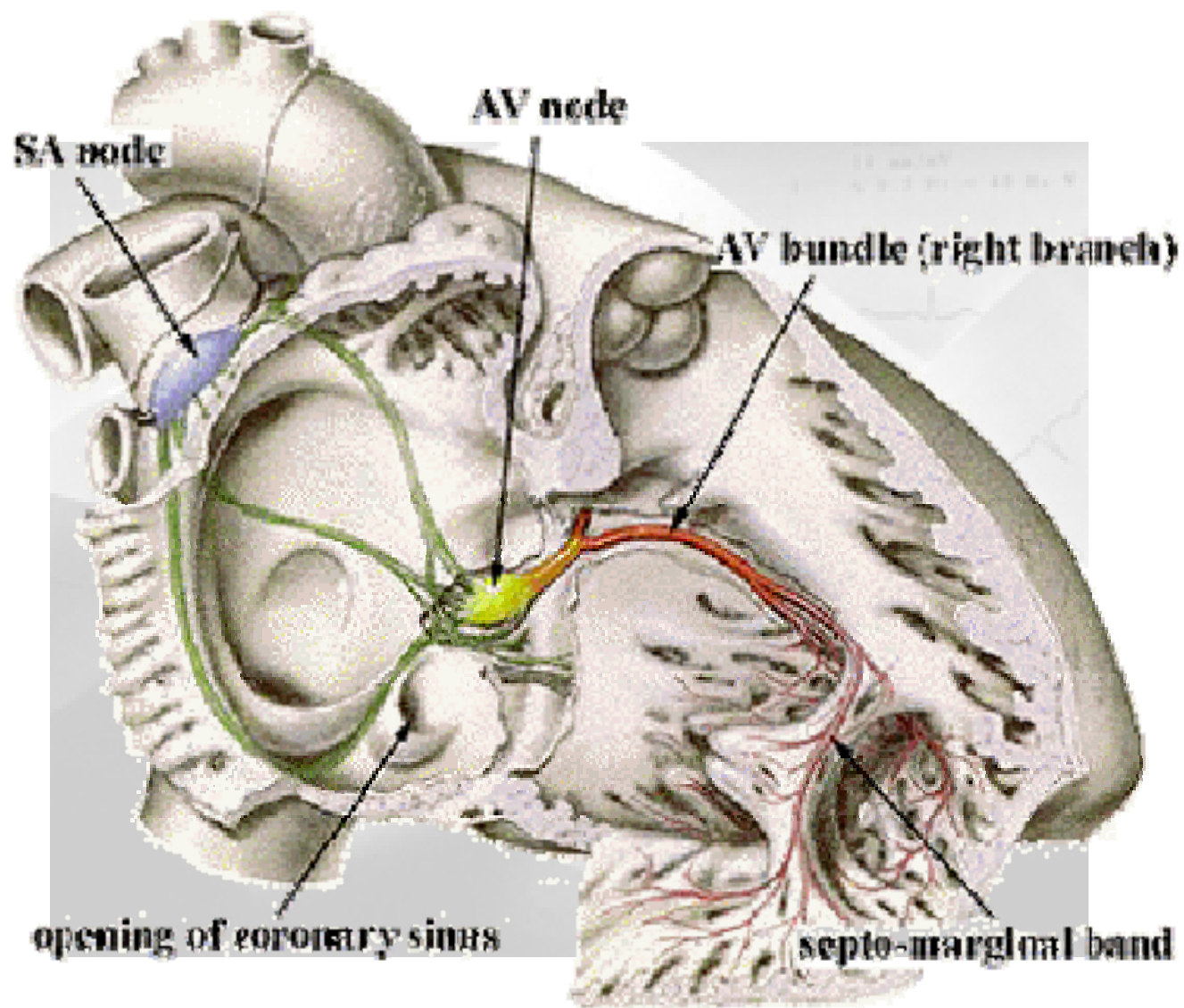
- **SA Node** (sinoatrial node)
  - Right atrium near SVC entrance
  - Primary pacemaker of the heart - generates impulses faster than any other myocardial cell
  - **Inherent rate: 60-100=NSR**
- **Intranodal Tracts**
  - Carry electrical impulses through the atria resulting in atrial contraction



# Conduction System

- **AV Node (Gate Keeper)**
  - Located in right atria, close to tricuspid valve
  - Accepts impulses from SA node and delays them, allowing complete atrial contraction and optimal ventricular filling time
  - Assumes role of pacemaker if SA node fails
  - **Inherent rate: 40-60**





# Conduction System

- **Bundle Branches**

- Conducts impulses through the ventricles
- Assumes pacemaker duties if higher electrical centers fail
- **Inherent rate: 20-40**

- **Purkinje Fibers**

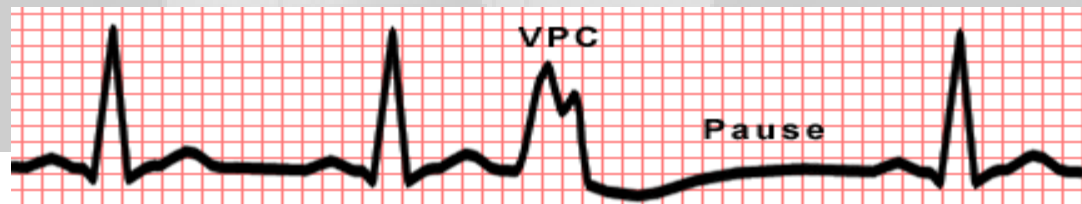
- Conduct impulses to the outer walls of the ventricles
- **Inherent rate: 20-40**

# Conduction System

- **Unique Myocardial Tissue Properties**
  - **Automaticity**: initiate impulse
  - **Excitability**: respond to impulse
  - **Conductivity**: transmit impulse
  - **Contractility** (inotropy): ability to shorten and lengthen
  - **Rhythmicity** (chronotropy): rate and regularity

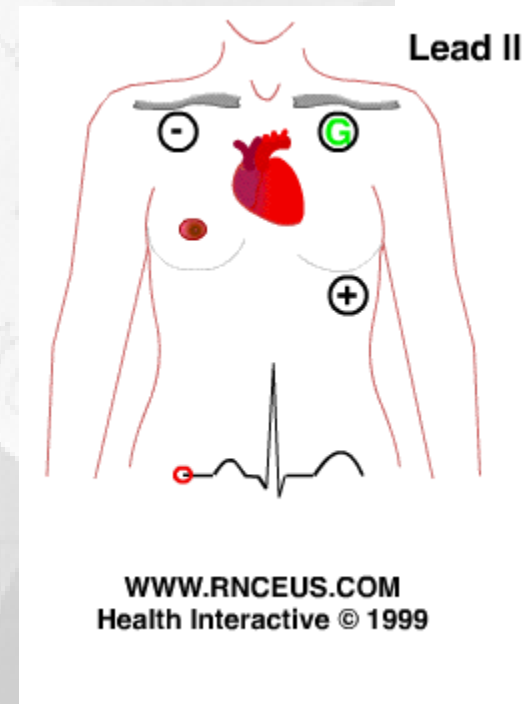
# Electrophysiology of the Heart

- An EKG is a recording of the heart's electrical activity
- The EKG shows electrical activity not mechanical (we assume electrical causes mechanical)
- The stronger the current, the taller the deflection on the EKG print out



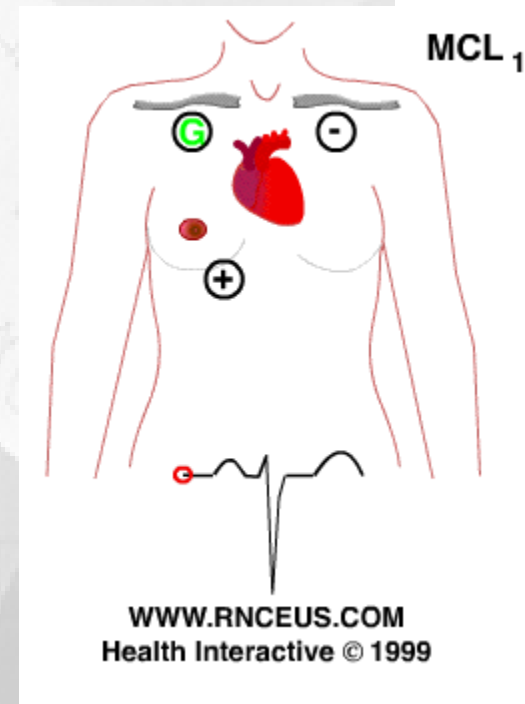
# Electrophysiology of the Heart

- **Positive deflection**
- Stylus moves up and away from baseline
- Impulse is traveling toward + lead

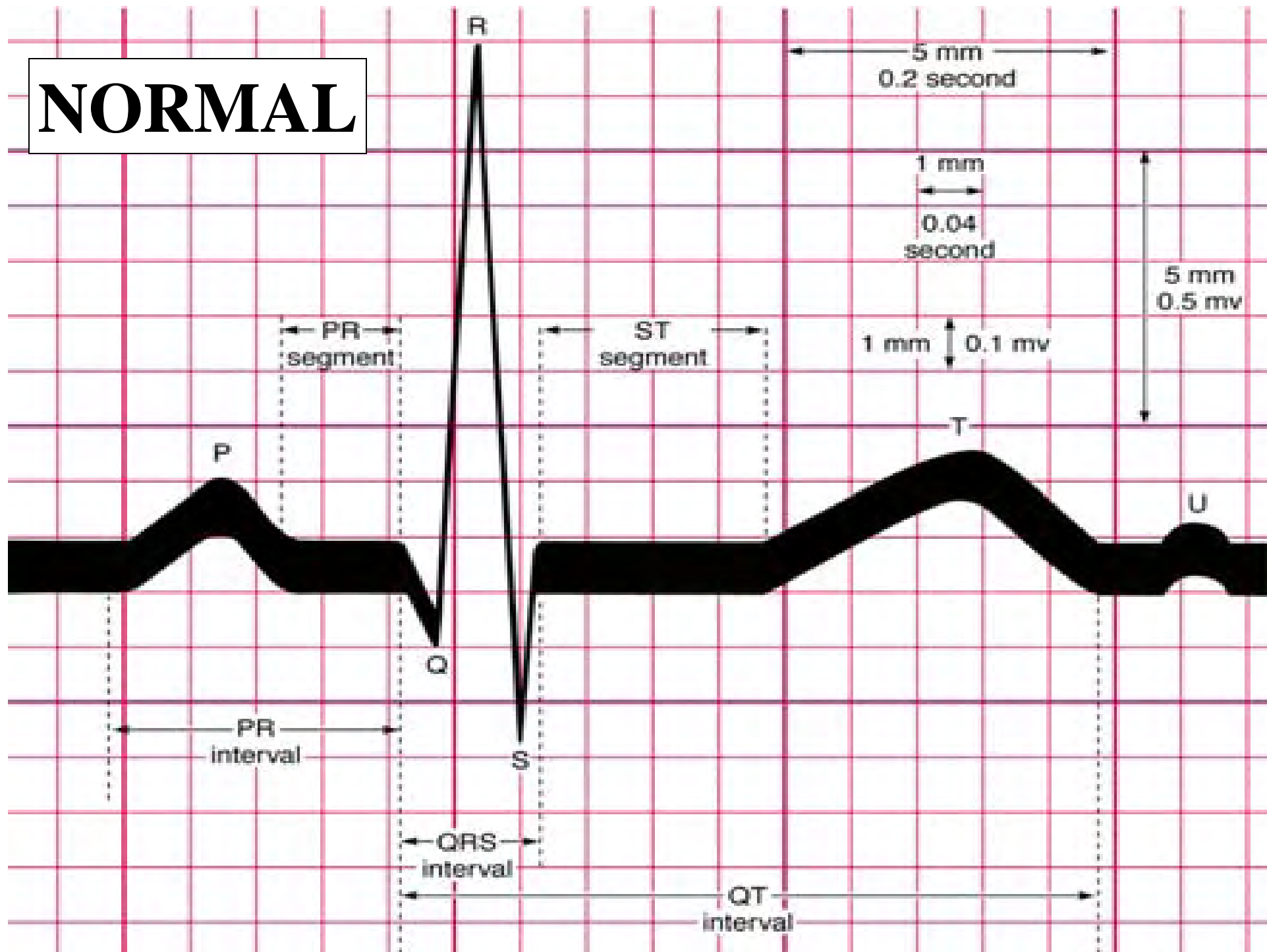


# Electrophysiology of the Heart

- **Negative deflection**
- Stylus moves down and away from baseline
- Impulse traveling away from + lead



**NORMAL**



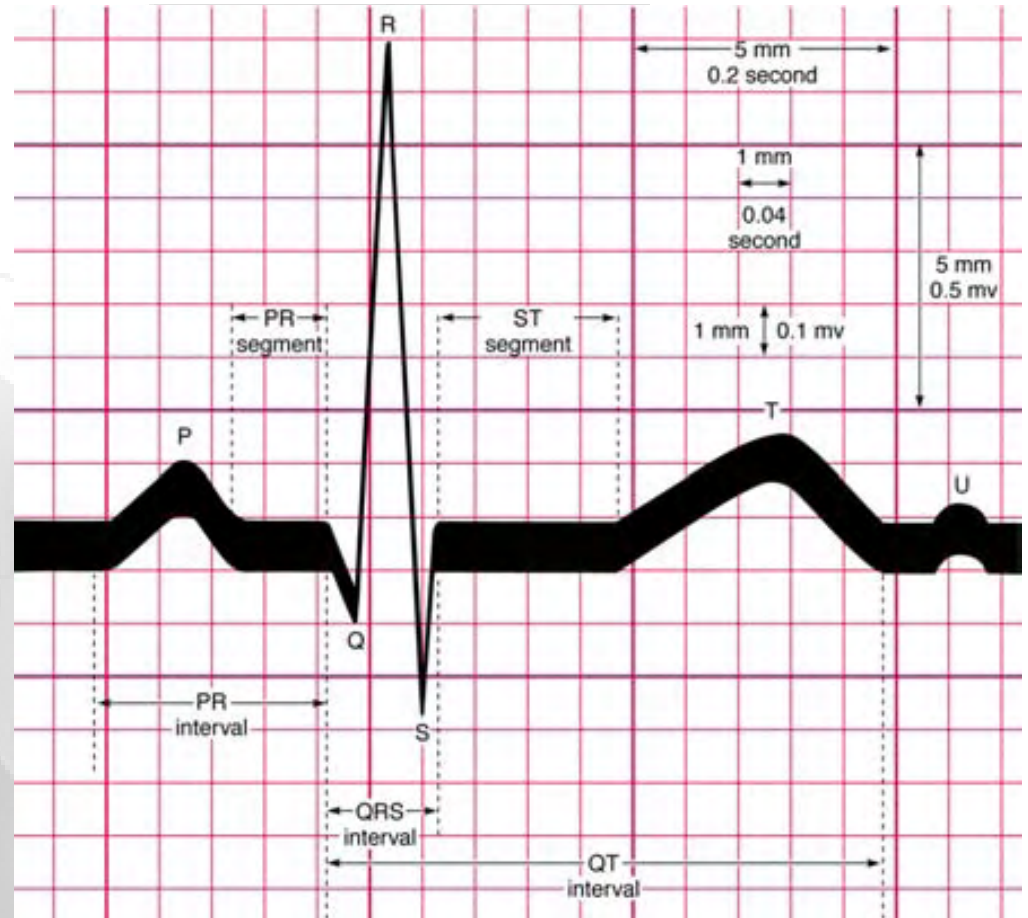
# Normal Time Intervals

Time Intervals

P-R Interval (PRI)

QRS Interval

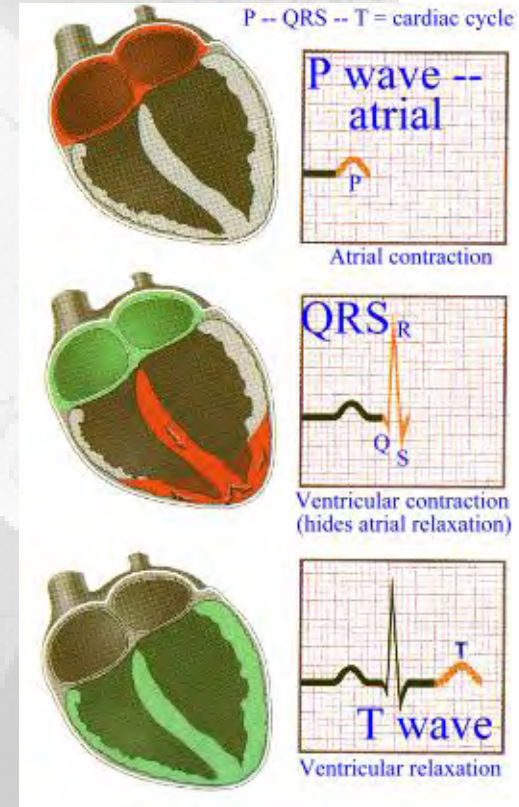
S-T Segments





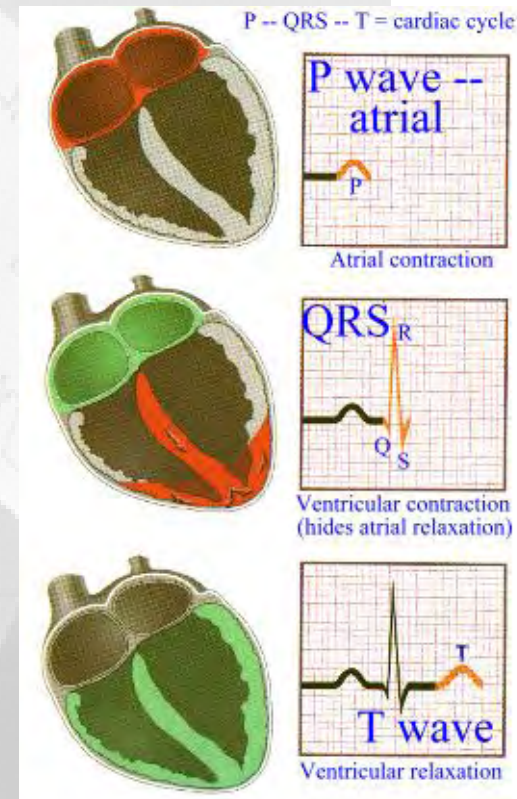
# Wave Interpretation

- P wave – atrial depolarization



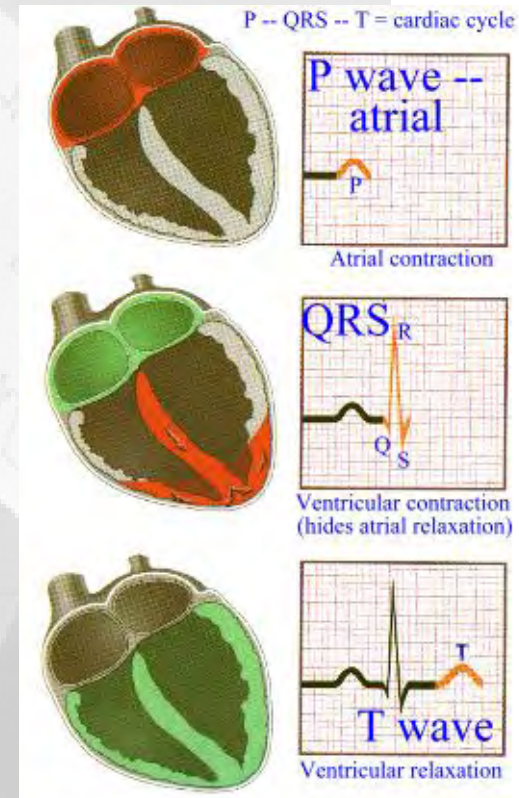
# Wave Interpretation

- QRS – ventricular depolarization
  - Q: 1<sup>st</sup> – deflection after P wave
  - R: 1<sup>st</sup> + deflection after P or Q
  - S: 1<sup>st</sup> – deflection after R wave
- Normal measurement **0.08-0.12**



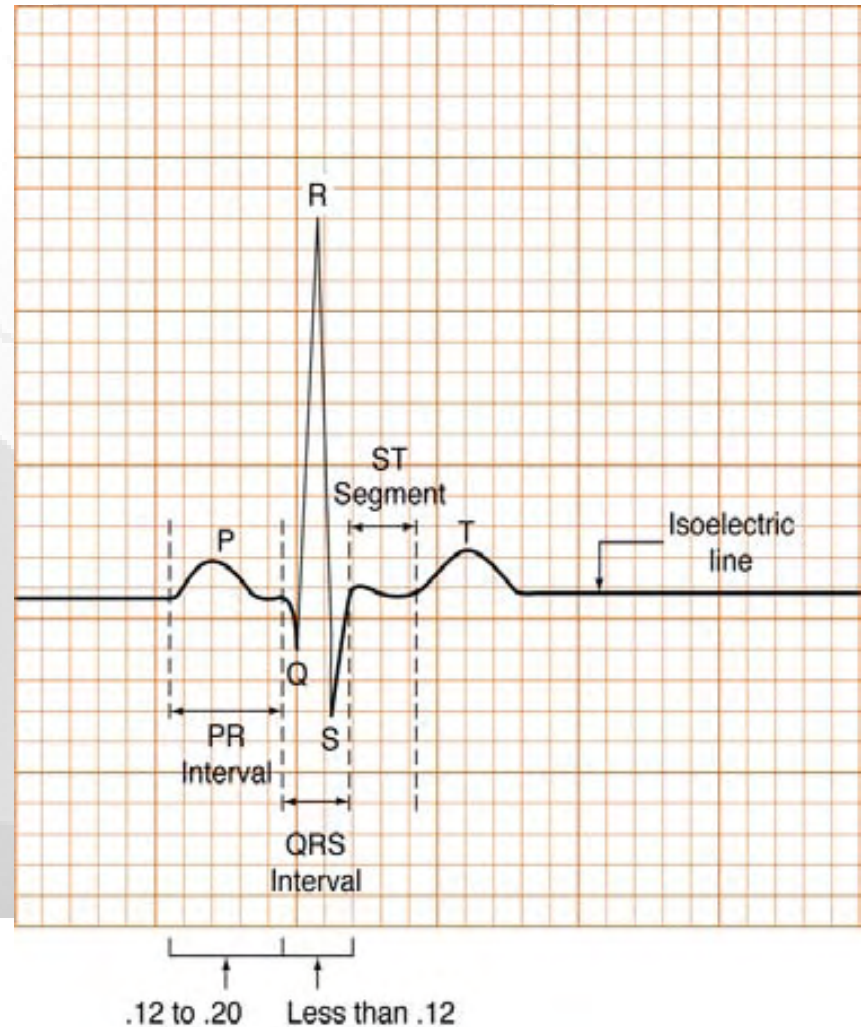
# Wave Interpretation

- T wave – ventricular repolarization



# PR Interval (PRI)

- Beginning of P wave to the beginning of the Q or R wave
- Normal – **0.12-0.20**
- What is the significance of the PR interval?



The background of the slide features a collage of several ECG (heart rate) rhythm strips. These strips are overlapping and semi-transparent, showing various waveforms and grid patterns. The text 'Review of ECG Rhythms' is centered over this background.

# Review of ECG Rhythms

# Normal Sinus Rhythm (NSR)

- EKG criteria
  - P wave – present & consistent
  - PR interval – 0.12 - 0.20 & consistent
  - QRS complex – present & consistent
  - Conduction ratio – 1:1
  - Rate/Rhythm – 60 -100/regular rhythm

# Normal Sinus Rhythm (NSR)

- **Etiology** – gold standard. All other rhythms are compared to NSR. Normal only refers to its rate (60-100), sinus refers to where it originates from (SA node), rhythm meaning it is continuous.



# Supraventricular Tachycardia (SVT)

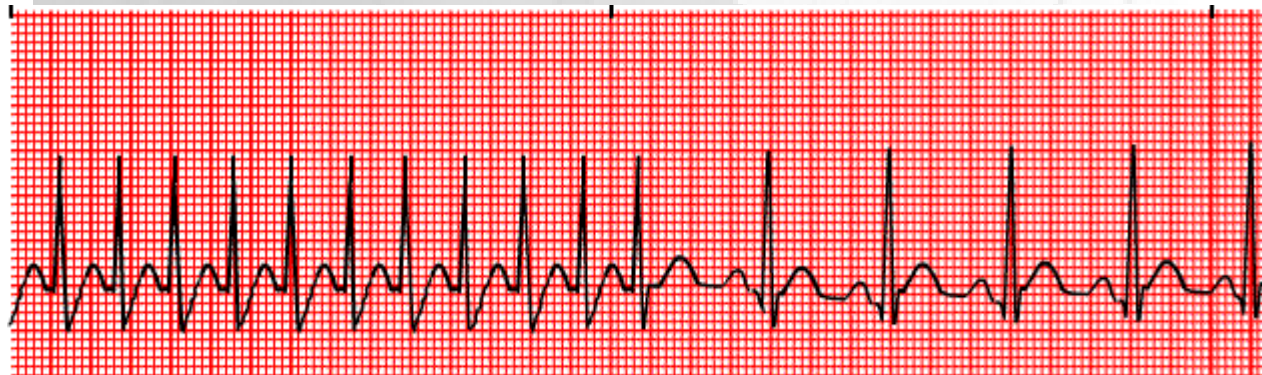
- EKG criteria
  - P wave – usually cannot see, may be buried in preceding T wave. Will look different than P wave from the SA node.
  - PR interval – 0.12-0.20 if you see P wave
  - QRS complex – present, consistent & **NARROW**
  - Conduction ratio – 1:1, if you see P waves
  - Rate/Rhythm – greater than 150, usually between 151-250. Always **REGULAR**



# Supraventricular Tachycardia (SVT)

- **Etiology-** can happen at any age
  - Stress
  - Overexertion
  - Tobacco
  - Caffeine

*Usually not associated with heart disease*



# Atrial Fibrillation (A-Fib)

- EKG criteria
  - P wave — none, can have wavy baseline
  - PR interval — none
  - QRS complex — narrow, irregular
  - Conduction ratio — none
  - Rate/Rhythm — can be rapid  $>150$  or slow  $<60$ ,  
always irregular

# Atrial Fibrillation (A-Fib)

## Etiologies-

### ***Acute***

- ETOH ingestion, caffeine, drugs
- Stress

### ***Chronic***

- Heart disease (old MI)
- CHF



# Atrial Fibrillation (A-Fib)

Disorganized electrical activity in atria

- Multiple ectopic foci
- Not all impulses will be picked up by AV node

**Always irregular and no discernible P waves**



HEALTH INTERACTIVE © 1999 - WWW.RNCEUS.COM

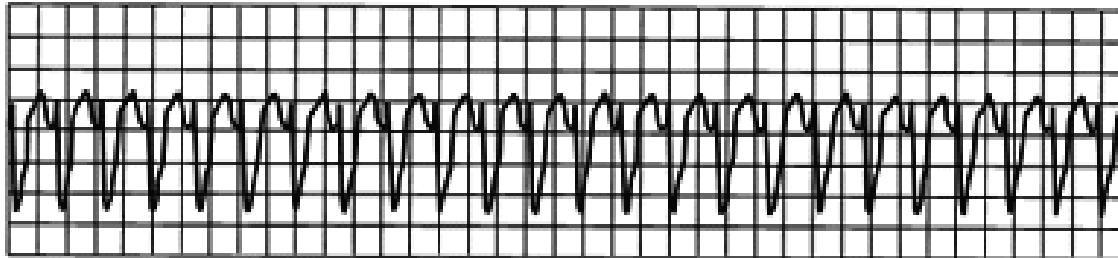
# Ventricular Tachycardia (V-tach)

- **EKG Criteria**

- **P wave** – none
- **PR interval** – none
- **QRS complex** – wide and fat with 3 or more PVCs in a row
- **Conduction ratio** – none
- **Rate/Rhythm** – 101-300 (usually less than 180) regular

# Ventricular Tachycardia (V-tach)

- Etiology
  - Hypoxia, damage to ventricles, sympathetic stimulation, ischemia and acidosis, hypokalemia, MI, electric shock, CHF, myocardial contusion, electrolyte imbalance, or ingestion of stimulants



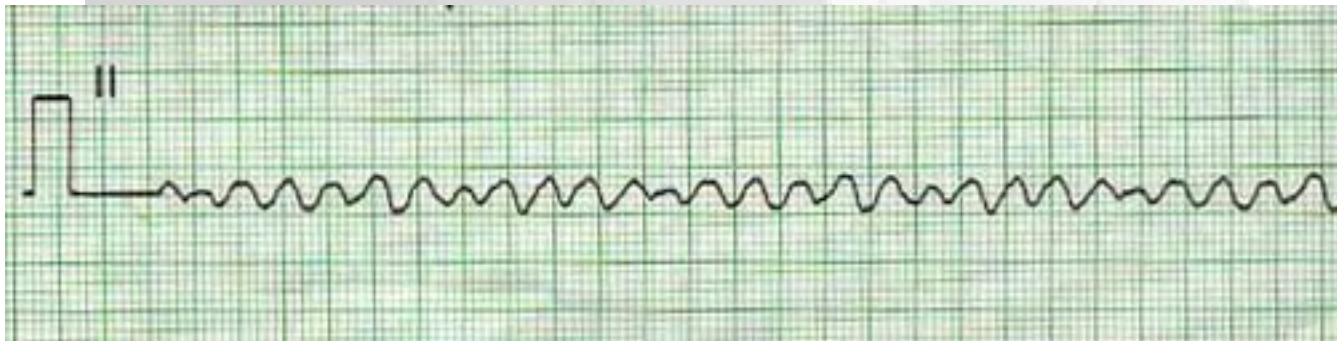
# Ventricular Fibrillation (V-Fib)

- EKG Criteria
  - P wave – none
  - PR interval – none
  - QRS complex – chaotic
  - Conduction ratio – none
  - Rate/Rhythm – none



# Ventricular Fibrillation (V-Fib)

- **Etiology** – damage to ventricles, sympathetic stimulation, drugs (cocaine, tricyclics), hypoxia, acidosis, low K<sup>+</sup>, MI, electric shock, CHF, chest trauma, R on T phenomenon, or progression from V-tach





The background of the slide is a grayscale ECG (heart rate) tracing. The waveform is visible but faded, showing typical P waves, QRS complexes, and T waves. The text is overlaid on this background.

# Review of Myocardial Infarction (MI)

# Pathophysiology of an MI

- Prolonged imbalance between oxygen supply and demand.
- Anaerobic metabolism  $\sim\sim>$  lactic acidosis.
- Prolonged ischemia causes electrical and mechanical death of myocardium distal to the occluded artery.

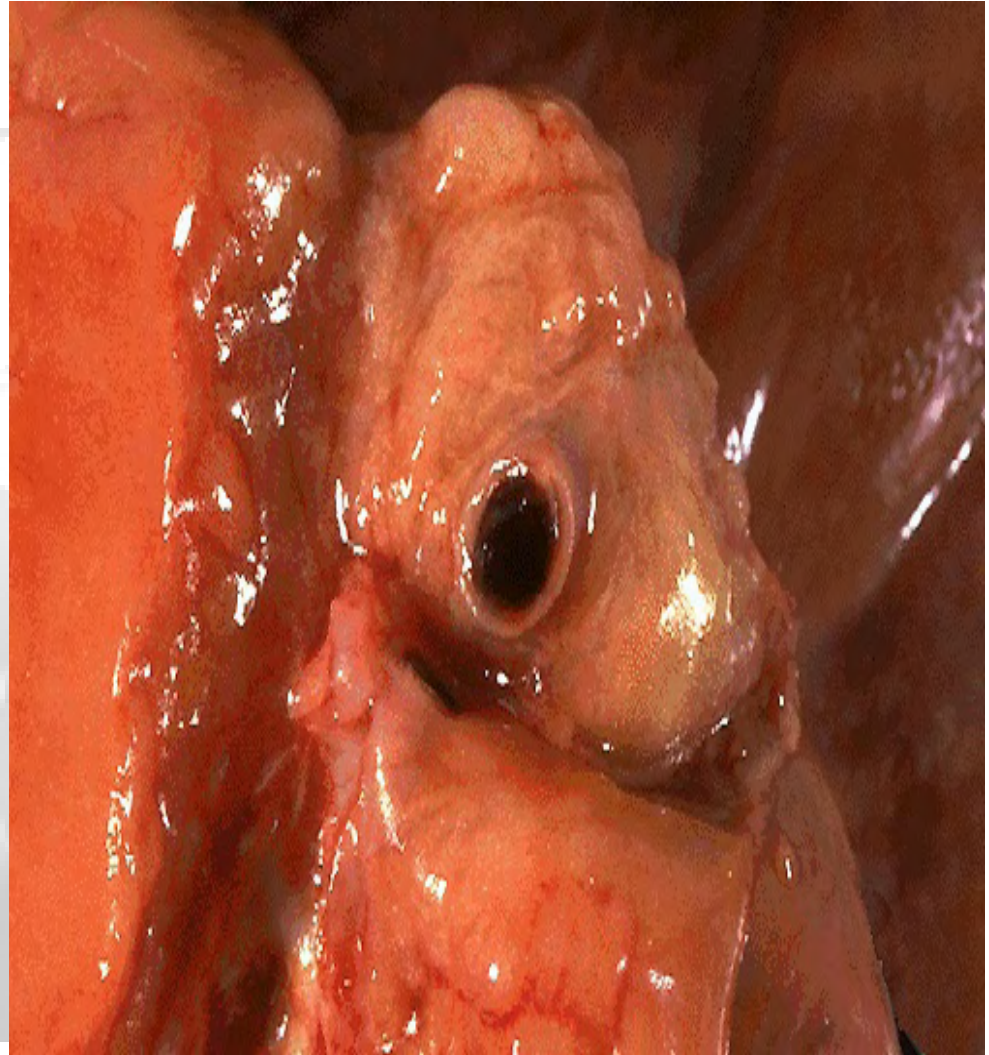
# Pathophysiology of an MI

- Contractility and compliance are decreased
- Left ventricular dysfunction
- Ischemia, injury and acidosis cause electrical irritability
- Healing process takes 2-3 months, firm scar forms

# Pathophysiology of an MI

- Most involve the left ventricle or intraventricular septum.
- Size of infarct is determined by the metabolic needs of the tissue supplied by the occluded vessel.

**This is a cross section of a complete coronary artery occlusion. The clot is completely imbedded in the artery, inhibiting blood flow distally.**



# Etiology of an MI

- Coronary artery disease
- Coronary artery thrombosis (most MI's)
- Coronary artery spasm
- Drugs – usually illicit (cocaine, methamphetamine)
- Shock
- Trauma

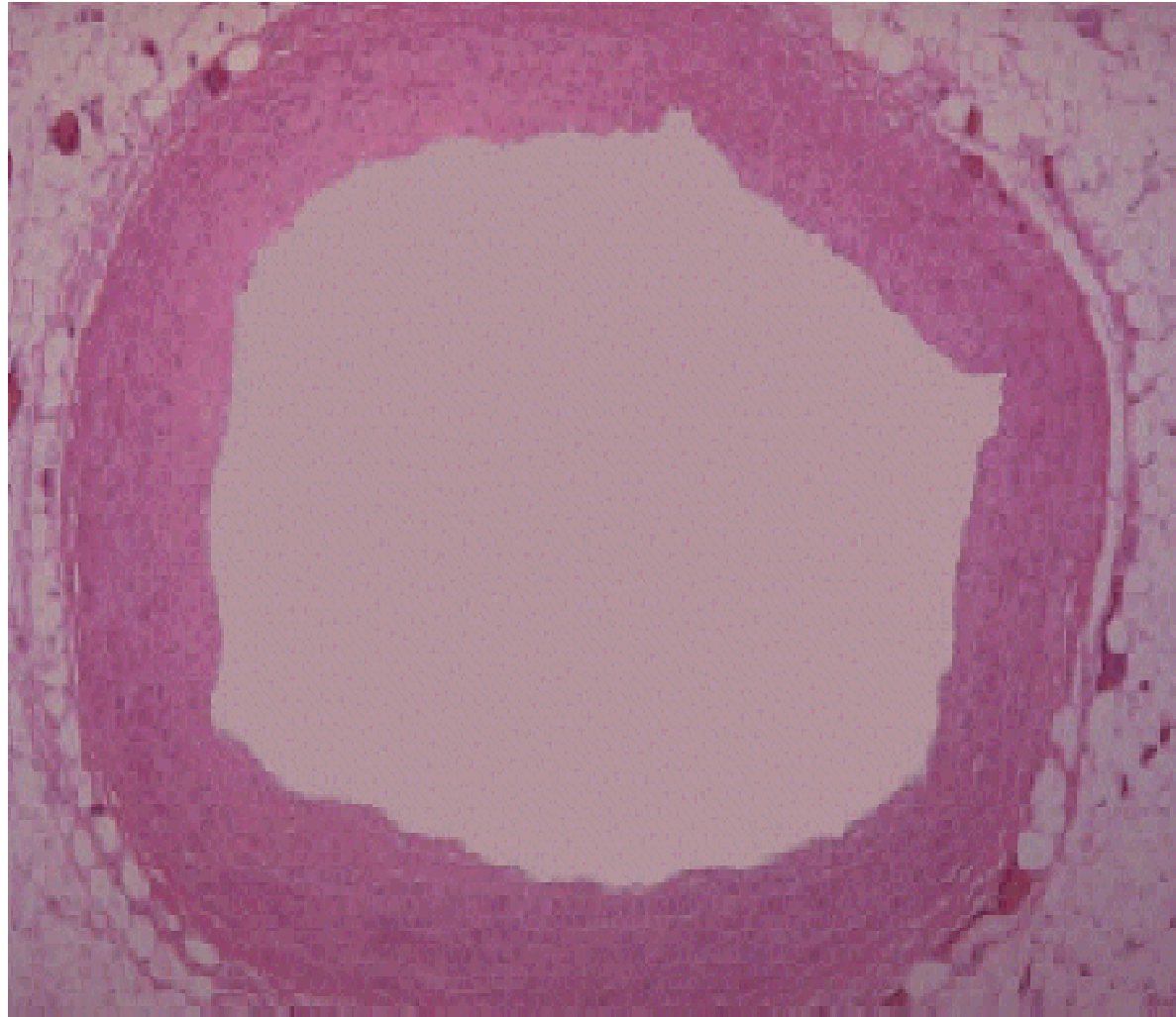
# Risk Factors

- MODIFIABLE RISK FACTORS

- Hypertension
- Sedentary Lifestyle
- Smoking
- Obesity
- Hypercholesterolemia

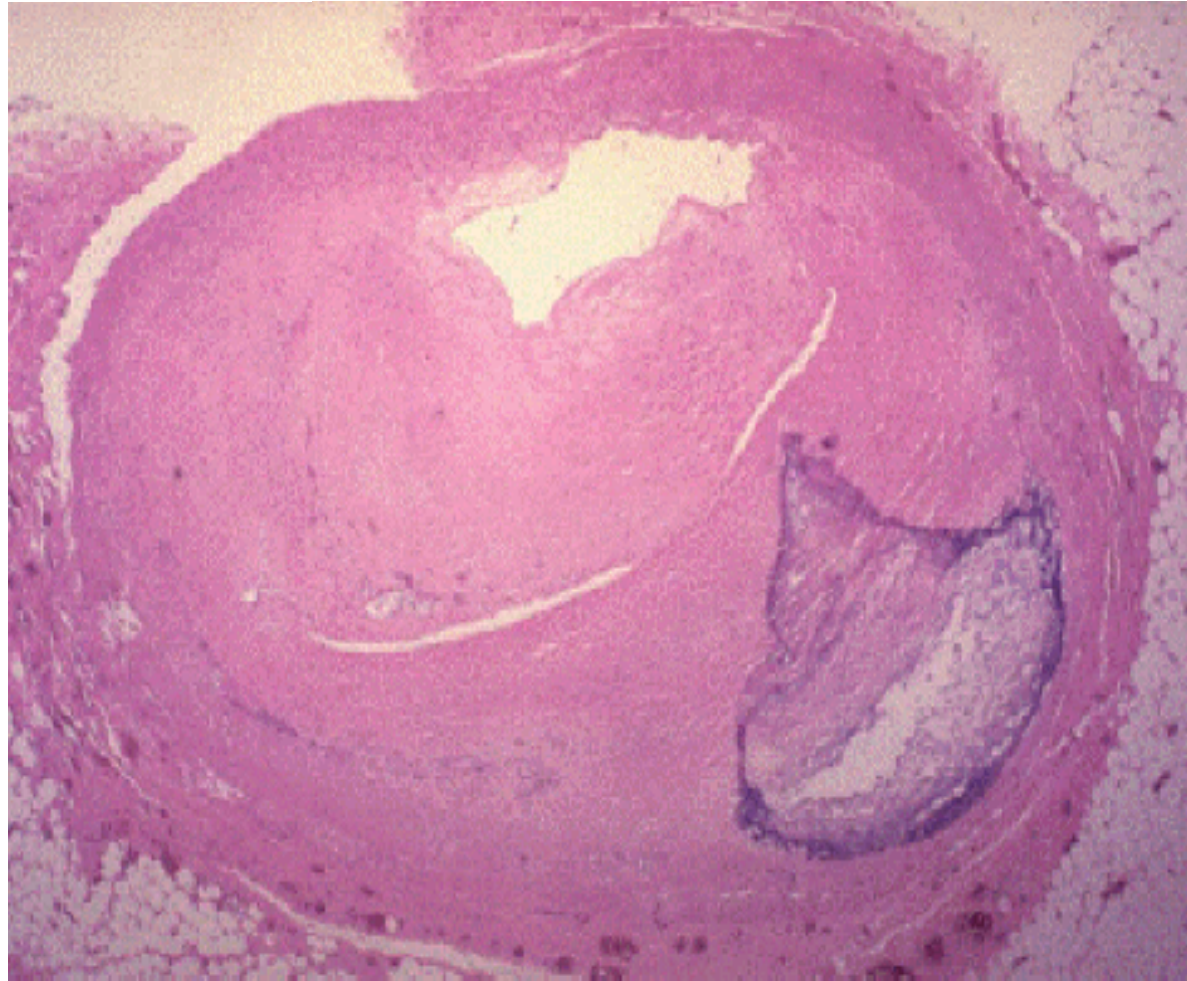
- UNMODIFIABLE RISK FACTORS

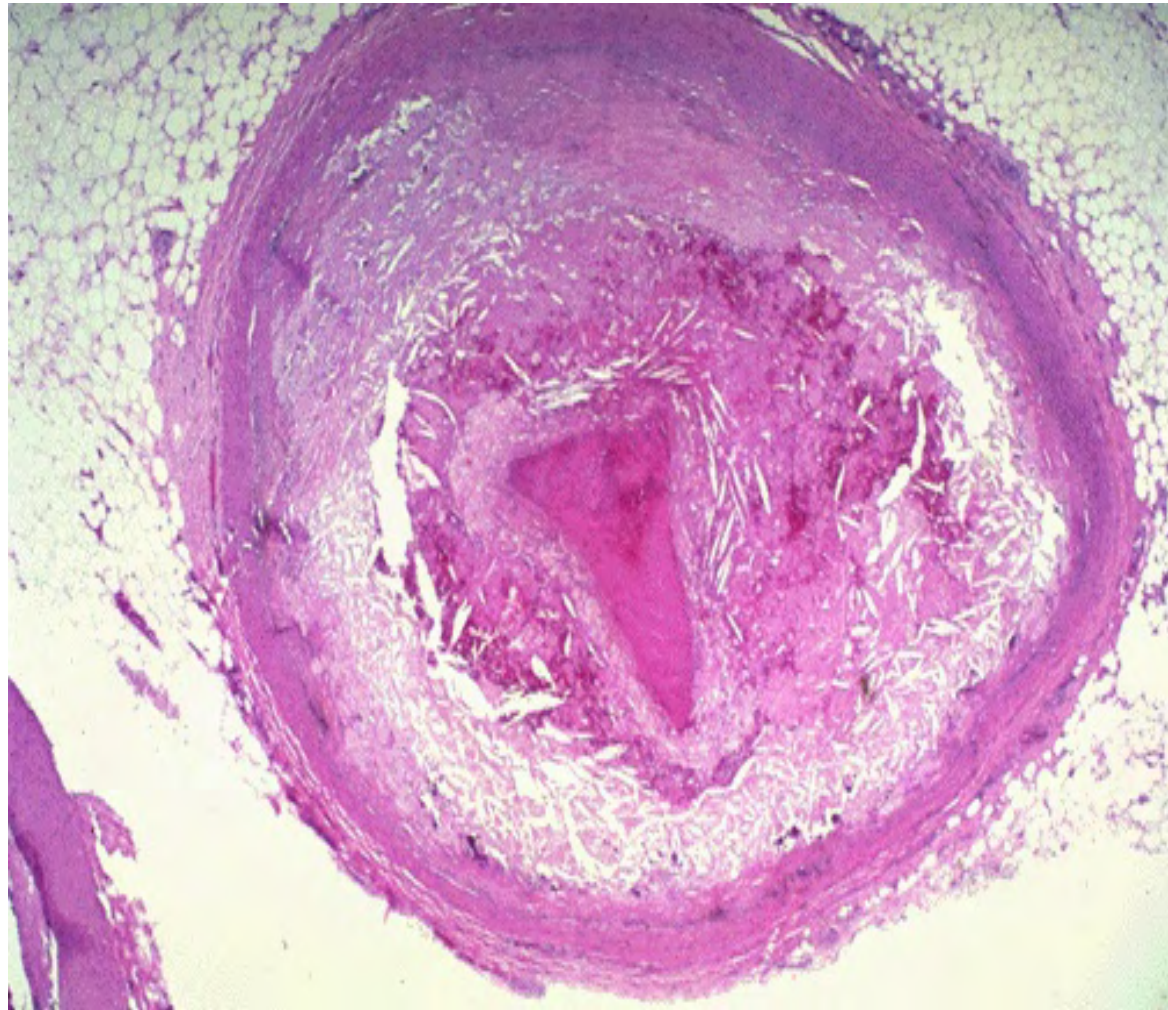
- Heredity
- Advancing age
- Gender
- Diabetes Mellitus











# Signs & Symptoms of an MI

- **Signs and symptoms can vary from person to person; however, some “*classic*” symptoms are:**

Tachycardia

Feeling of impending doom

Tachypnea

Chest discomfort

Dyspnea

Nausea/vomiting

Diaphoresis

Jaw discomfort

Anxiety

Weakness

Left arm pain or numbness

# Signs & Symptoms of an MI

- Atypical or silent MIs present with little or no symptoms. The patient only discovers that he or she has had an MI after the damage has been done. Patients may also present with vague complaints such as syncope, weak & dizzy, abdominal pain or “sick”.

# Treatment of an MI

- Goals
  - Limit the size of the infarct
  - Relieve pain and apprehension
  - Prevent the development of serious dysrhythmias
- The above is done with medications and medical interventions

# Treatment of an MI

- Pre-hospital Treatment
  - High flow Oxygen
  - Venous access
  - Nitroglycerin sublingual spray as indicated
  - Oral Aspirin
  - Morphine sulfate for pain relief as indicated
  - Dopamine as indicated

# Treatment of an MI

- Hospital setting
  - Fibrinolytics Therapy (clot busters)
  - Percutaneous Intervention
    - Angioplasty/Stents
  - Coronary Artery Bypass Grafting



# Fibrinolytics/Thrombolytics (Clot Busters)

- Examples
  - TNK
  - Activase or t-PA
  - Eminase
  - Retavase
  - Streptase or streptokinase
  - Abbokinase

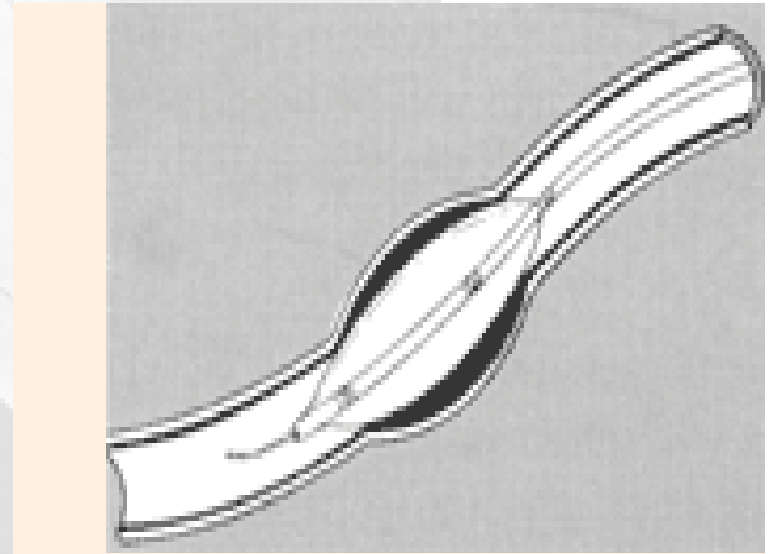


# Fibrinolytics/Thrombolytics (Clot Busters)

- These drugs dissolve or break up blood clots that are blocking blood flow through a coronary artery.
- Best if used within 3 hours from the onset of symptoms.
- Studies have shown an 18% reduction in death when fibrinolytics are used after an MI.

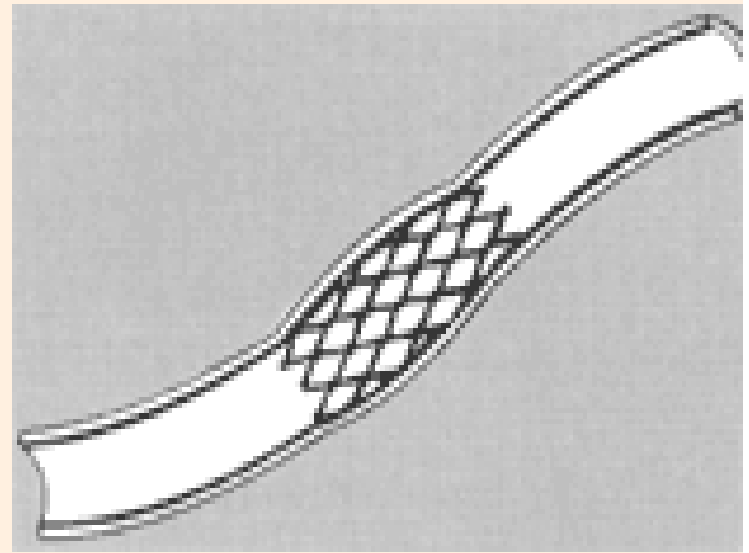
# Percutaneous Coronary Intervention (PCI)

- Commonly called cardiac catheterization
- Angioplasty – small catheter guided through an artery to the location of the blockage where the balloon is inflated increasing the lumen size of the vessel



# Percutaneous Coronary Intervention (PCI)

- Stenting – usually performed concurrently with angioplasty. After lumen/vessel size is increased, a small wire tube is inserted to keep coronary artery open.



# PCI

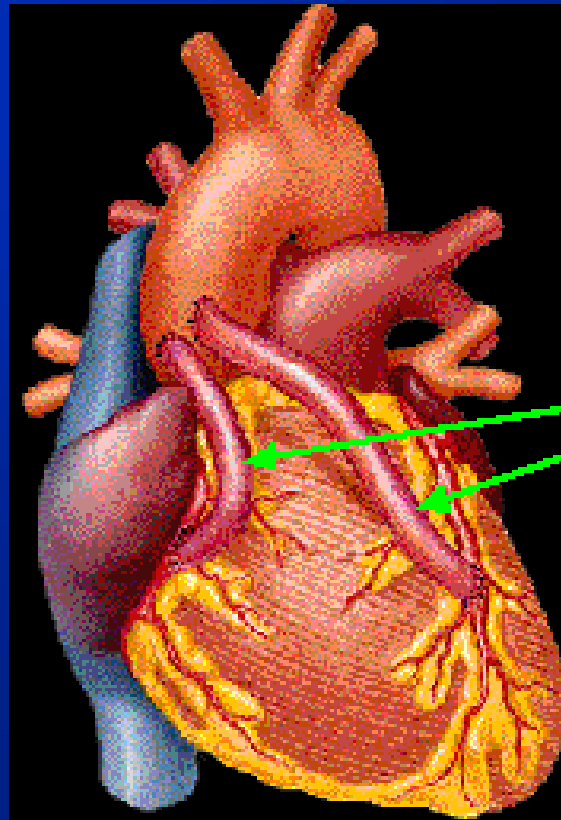
- Rapid primary PCI is the most effective strategy for saving heart muscle.
- Emergency angioplasty, with or without stenting, is typically the first choice of treatment if available.
- PCI is a treatment in itself or a diagnostic tool to determine the need of Coronary Artery Bypass Grafting (CABG).

# Coronary Artery Bypass Grafting (CABG)

- Utilized when PCI is unsuccessful due to a complete occlusion of one or more coronary arteries.
- Known as open heart surgery although the heart itself is not opened during the procedure.

## Coronary Artery Bypass Surgery

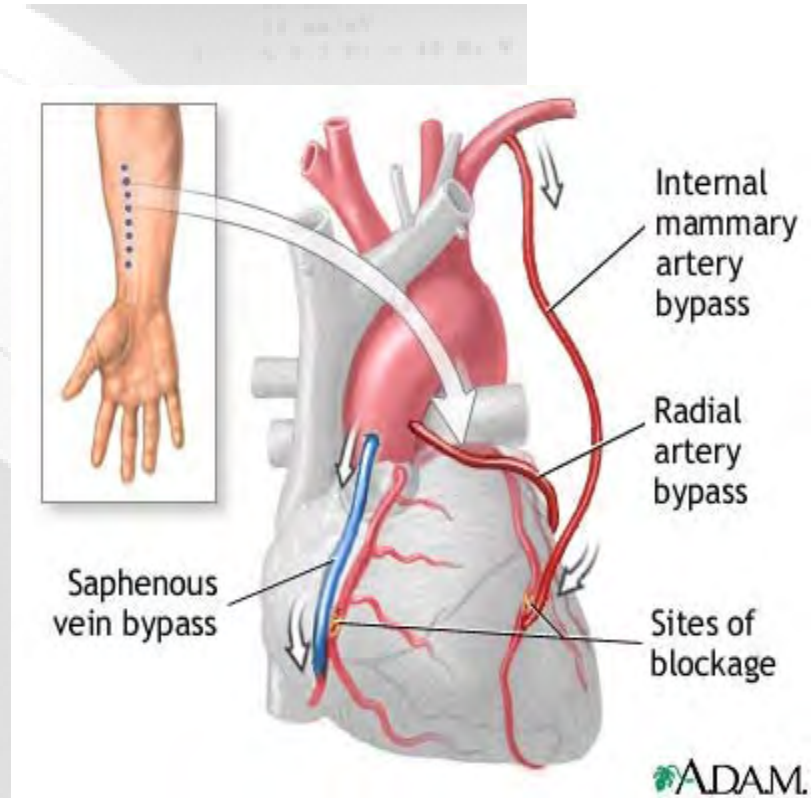
---



vein  
grafts

# Coronary Artery Bypass Grafting (CABG)

- If there is more than one coronary artery blocked, multiple grafts will be performed.
- Terms like double bypass, triple bypass etc., explain the number of obstructions bypassed.





# Related EMS Procedural Changes

- 12-Lead EKG Medical Control Guideline
- Ref. No. 513, ST Elevation Myocardial Infarction Patient Destination
- Ref. No. 502, Patient Destination
- Ref. No. 503, Guidelines for Hospitals Requesting Diversion of ALS Units
- M-4 SFTP/Base Hospital Treatment Guidelines

# 12 Lead EKG Medical Control Guideline

LOS ANGELES COUNTY EMS AGENCY  
MEDICAL CONTROL GUIDELINES

## ASSESSMENT

### PRINCIPLE:

1. The 12-lead electrocardiogram (EKG) in the prehospital care setting is a key component to the early diagnosis and ongoing definitive treatment for patients with acute myocardial infarction (MI).
2. 12-lead EKGs are used with a variety of patients. The goal is to incorporate the 12-lead EKG into the decision making about the ST-elevation MI (STEMI) patient. The transmission or reporting of the STEMI should decrease "door-to-intervention" times in 9-1-1 receiving hospitals.
3. Only paramedics who are employed by a provider agency with a 12-lead EKG program and who have received the required training may perform a 12-lead EKG.
4. The 12-lead EKG should be performed as part of a complete assessment for a patient with chest pain/discomfort or a patient suspected of experiencing an acute cardiac event.
5. Necessary medical treatments shall not be delayed in order to obtain a 12-lead EKG.

### GUIDELINE:

1. Apply standard Lead II monitor. Treat rhythm as appropriate. Perform 12-lead EKG in conjunction with applicable treatment guidelines.
2. A 12-lead EKG shall be acquired on patients who complain of chest pain/discomfort of suspected cardiac etiology and/or patients who the paramedics suspect are experiencing an acute cardiac event.
3. Paramedics should utilize the computerized analysis of the EKG machine. If the computer analysis of the 12-lead EKG indicates an acute STEMI or the manufacturer's equivalent of STEMI, this information shall be conveyed to the base hospital. Transmit, if capable, the 12-lead EKG demonstrating STEMI to the receiving STEMI Receiving Center (SRC) if requested.
4. Every effort should be made to maintain patient's privacy and dignity while obtaining 12-lead EKG readings.
5. Label the 12-lead EKG with the sequence number from the patient's EMS Report Form.

# 12 Lead EKG Medical Control Guideline

- Key Points

- The 12-lead EKG is part of a complete assessment for patients with chest pain/discomfort or suspected of experiencing an acute cardiac event.
- The 12-lead EKG preparations and treatment occur simultaneously with all ALS team activity halted while the 12-lead EKG tracing is performed.
- **The Sequence Number must be documented on the EKG either by machine entry or hand written.**

# 12 Lead EKG Medical Control Guideline

- Key Points
  - If the patient is stable, repeat 12-lead EKGs that have wavy baselines or artifact that may cause false positives.
  - Report the underlying rhythm and computerized \*\*\*Acute MI\*\*\* readout from the EKG machine to the base hospital.
    - Paramedics **are not** to interpret the 12-lead EKG.
    - Report wavy baselines or artifact to the base hospital/SRC.

# New Policy: Reference No. 513

## ST Elevation Myocardial Infarction

### Patient Destination

- Definitions
  - ST Elevation Myocardial Infarction (STEMI):  
An acute MI that generates ST-segment elevation on the prehospital 12-lead EKG.
  - STEMI Receiving Center (SRC): A facility licensed for a cardiac catheterization laboratory and cardiovascular surgery by DHS Licensing & Certification and approved by the LA County EMS Agency as a SRC.

# Reference No. 513

- Key Points

Report minimal pertinent patient assessment information to the base hospital:

- Provider Agency Code
- Sequence Number
- 12 Lead EKG with Acute MI
- Level of Distress
- Provider Unit Number
- Chief Complaint
- Patient Age and Gender
- MAR & SRC with ETAs

It may be necessary to provide additional pertinent information, especially with the more critical patient.

# Reference No. 513

- Key Points
  - The base hospital will provide any needed medical direction or destination and notify the receiving SRC of the patient's arrival.
  - STEMI patients shall be transported to the most accessible open L.A. Co. EMS Agency approved SRC within 30 minutes by ground.

# Reference No. 513

- Key Points
  - Departments utilizing SFTP's shall use the updated M4 SFTP.
  - SRCs will be able to close on the ReddiNet system to STEMI patients. \*\*ED diversion does not equal SRC diversion\*\* SRC diversion is a new category on the ReddiNet system.



# Reference No. 513

What about patients who have a 12-lead readout of acute MI then deteriorate into cardiac arrest while on-scene?

- If the patient is not resuscitated to a viable rhythm- pronounce.
- If the patient is resuscitated to a viable rhythm- transport to the most accessible SRC.

What about patients who deteriorate into cardiac arrest enroute to the SRC?

- Continue resuscitative measures to the SRC.

# Reference No. 502

- Patient Destination
  - STEMI was added as a specialty center to which patients should be transported if they meet the criteria.
  - STEMI Receiving Center (SRC): Patients who are experiencing an ST-elevation myocardial infarction (STEMI) as determined by a field 12-lead EKG should be transported to an EMS Agency approved STEMI Receiving Center, regardless of service agreement rules and/or considerations.

# Reference No. 503

- Guidelines for hospitals requesting diversion of ALS units.
  - Added to Diversion Request Categories
    - Request for Diversion to STEMI Receiving Centers (SRC):  
Hospital unable to care for additional STEMI patients because the cardiac cath staff is already fully committed to caring for STEMI patients in the cath lab. The rationale for a temporary diversion shall be communicated via the ReddiNet system.
    - **NOTE: ED diversion does not prohibit a STEMI patient's transport to an open SRC.**

# Reference No. 503

- Guidelines for hospitals requesting diversion of ALS units
  - Transport time guidelines should be adhered to:
    - Twenty (20) minutes for a Trauma Center, SRC, PTC, PMC or Perinatal Center.
    - An additional ten (10) minutes, to a maximum of thirty (30) minutes for a Trauma Center, PTC, or SRC if the provider based resources at the time of transport allow.

# M-4 SFTP

- Changes for the SFTP treating chest pain (M-4):
  - Field Treatment:
    - #5 for 12-lead capable provider agencies, perform a 12-lead EKG.
    - **NOTE: If 12-lead EKG indicates ST elevation myocardial infarction (STEMI) or the manufacturer's equivalent of STEMI, base contact is required for notification and destination.**

# Base Hospital Treatment Guideline

## (M-4) Chest pain

September 2006 (REVISED) Los Angeles County SFTPs

### Field Treatment

1. Basic airway
2. Oxygen
3. Cardiac monitor/document rhythm and attach EKG strip  
Ⓢ
4. Venous access pm
5. For 12-lead capable provider agencies, perform a 12-lead EKG.

Note: If 12-lead EKG indicates ST elevation myocardial infarction (STEMI) or the manufacturer's equivalent of STEMI, base contact is required for notification and destination.

PERFUSING	POOR PERFUSION
<p>5. Nitroglycerin 0.4mg SL or transmucosal. ⓈⓈⓈ</p> <p>➤ May repeat in 3-5 minutes two times.</p> <p>6. Aspirin 162mg chewable tablets PO. ⓈⓈⓈ</p> <p>7. If pain unrelieved by 3 doses of nitroglycerin, morphine 2-10mg slow IVP titrated to pain relief. ⓈⓈ</p> <p>➤ May repeat pm.</p>	<p>5. BASE CONTACT</p>

M4

CHEST PAIN

Page 1 of 2

# 12-Lead EKG



# 12-Lead EKG

- Education must be specific to department and equipment manufacturer and should include:
  - Maintenance requirements
  - Monitor functions
  - Application of the 12-lead EKG
  - Review of the print out
  - Review of the transmission as applicable



# Application of the 12-lead & acquisition of EKG

- Every department and manufacturer will have different equipment and accessories associated with the monitors purchased.
- Acquisition does not have to increase scene time.
- Goals of acquisition include:
  - Clear
  - Accurate
  - Fast

# Application of 12-lead

- With all patients complaining of chest pain, apply the 12-lead EKG first.
- Prior to applying the leads to the chest, these steps must be taken:
  - Expose the chest
  - Remove hair
  - Prepare the skin

# Expose the Chest

- Remove all clothing above the waist as appropriate
- Replace with gown or sheet
  - Allows for complete exam
  - Prevents wire entanglement
  - Allows for quick defibrillation if needed

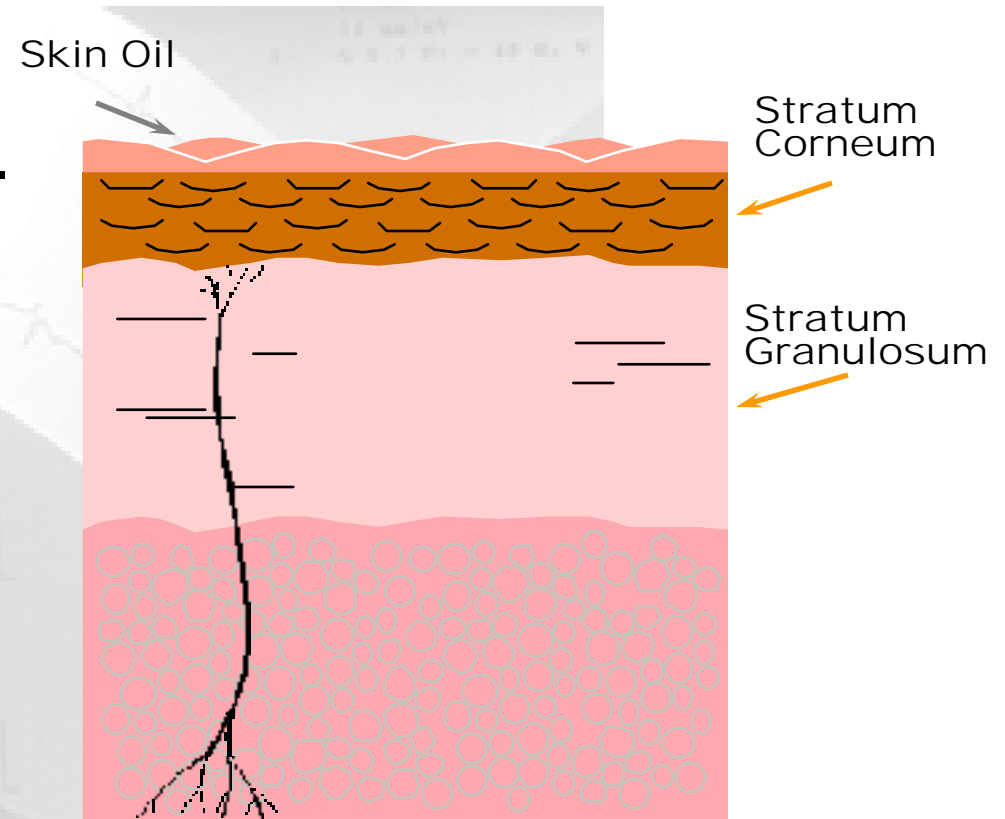
# Excess Hair Removal

- Clipper over razor
- Lessens risk of cuts
- Quicker
- Clippers with disposable blades available



# Skin Preparation

- Helps EKG monitor obtain stronger signal.
- Objectives
  - Remove skin oils
  - Remove portions of the stratum corneum
  - Scratch the stratum granulosum



# Skin Preparation



Angle of Louis

**Lead V<sub>1</sub>** The electrode is at the fourth intercostal space just to the right of the sternum.

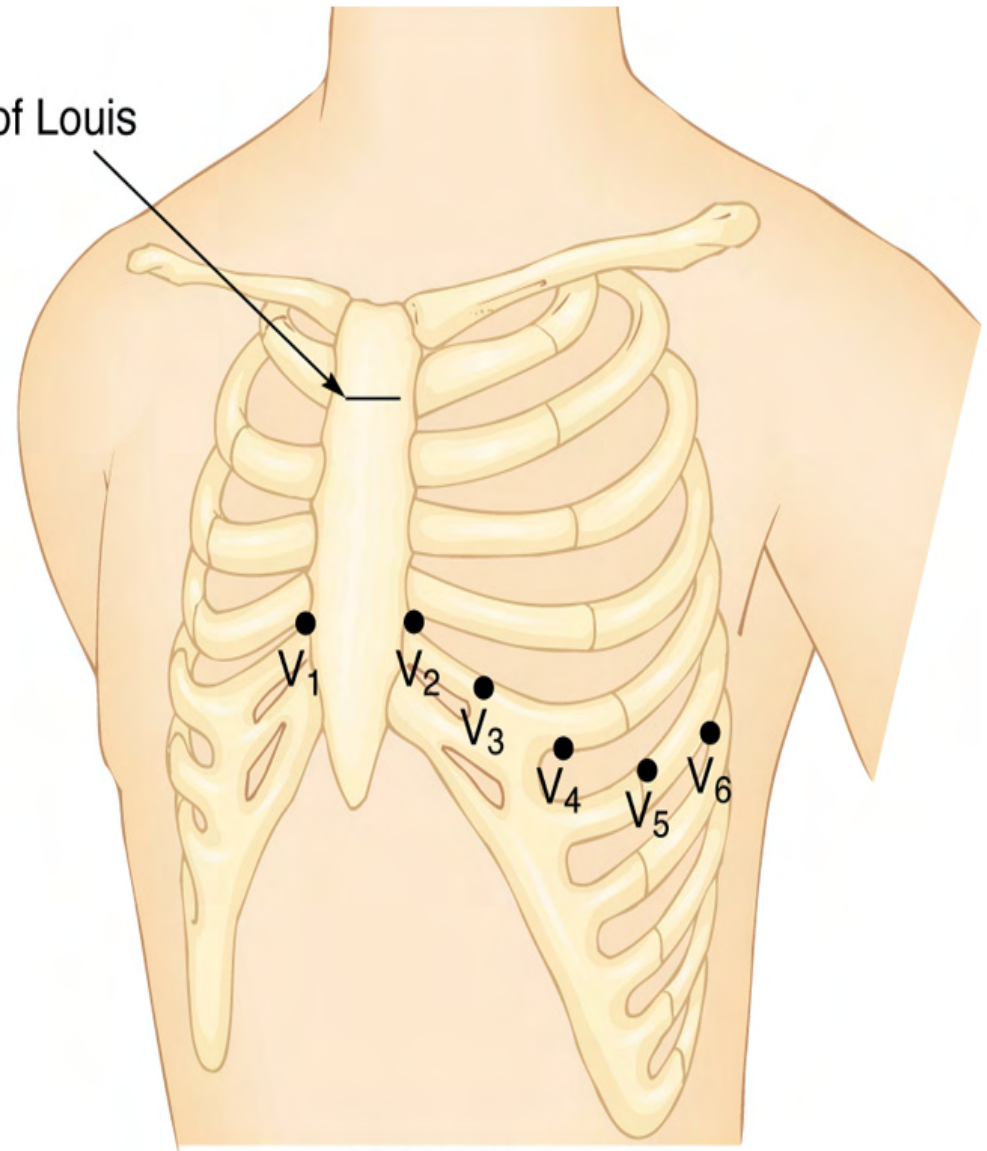
**Lead V<sub>2</sub>** The electrode is at the fourth intercostal space just to the left of the sternum.

**Lead V<sub>3</sub>** The electrode is at the line midway between leads V<sub>2</sub> and V<sub>4</sub>.

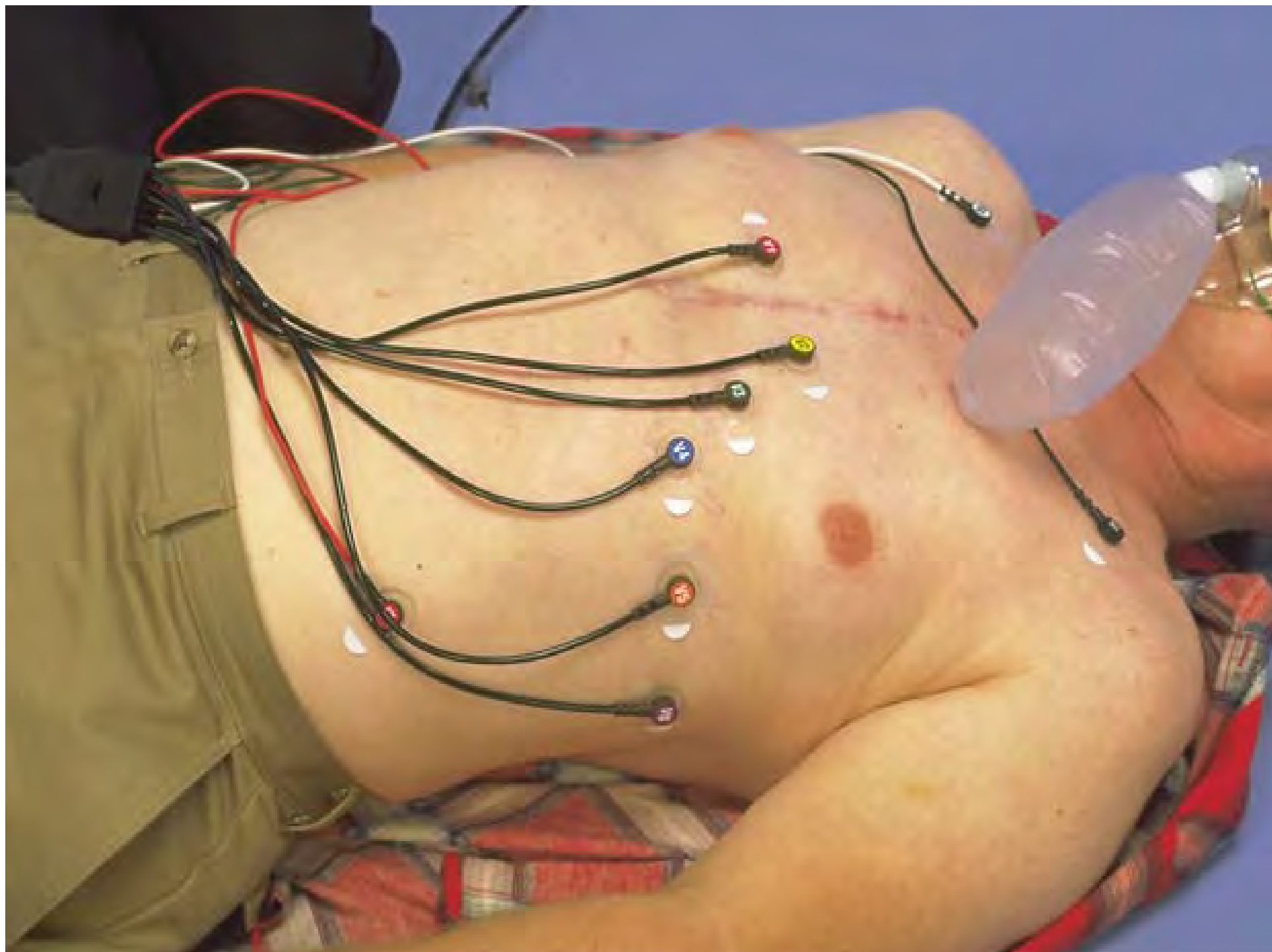
**Lead V<sub>4</sub>** The electrode is at the midclavicular line in the fifth interspace.

**Lead V<sub>5</sub>** The electrode is at the anterior axillary line at the same level as lead V<sub>4</sub>.

**Lead V<sub>6</sub>** The electrode is at the midaxillary line at the same level as lead V<sub>4</sub>.



Chest Lead Placement







# Acquiring the 12-lead

- Assessment
  - Vital Signs
  - Oxygen Saturation
  - IV Access
  - 12-Lead ECG
  - Brief History
- Treatment
  - Oxygen
  - Nitroglycerin
  - Aspirin
  - Morphine

# Acquiring the 12-lead

- Steps should be taken to reduce artifact
  - Skin Preparation
  - Patient movement
  - Cable movement
  - Vehicle movement
  - EMI

# Artifact or Wavy Baseline

- These two anomalies can produce a false positive reading on the 12-lead EKG.
- If you are getting positive reading with a wavy baseline or artifact and the patient is stable, **please repeat** the 12-lead EKG.
- Advise the base hospital of any wavy baseline or artifact on the 12-lead EKG with a readout of \*\*\*Acute MI\*\*\*.

# 12-lead EKG Patient Information

- The “Sequence Number” must be documented on the 12-lead EKG by either entry into the machine or hand written on the print out.
- The 12-lead is to be attached to the EMS Report Form or 902-M and left with the patient at the SRC.

# Review of Print Outs

- The only patients that should be triaged to a STEMI Receiving Center are those who have a 12-lead EKG read out of

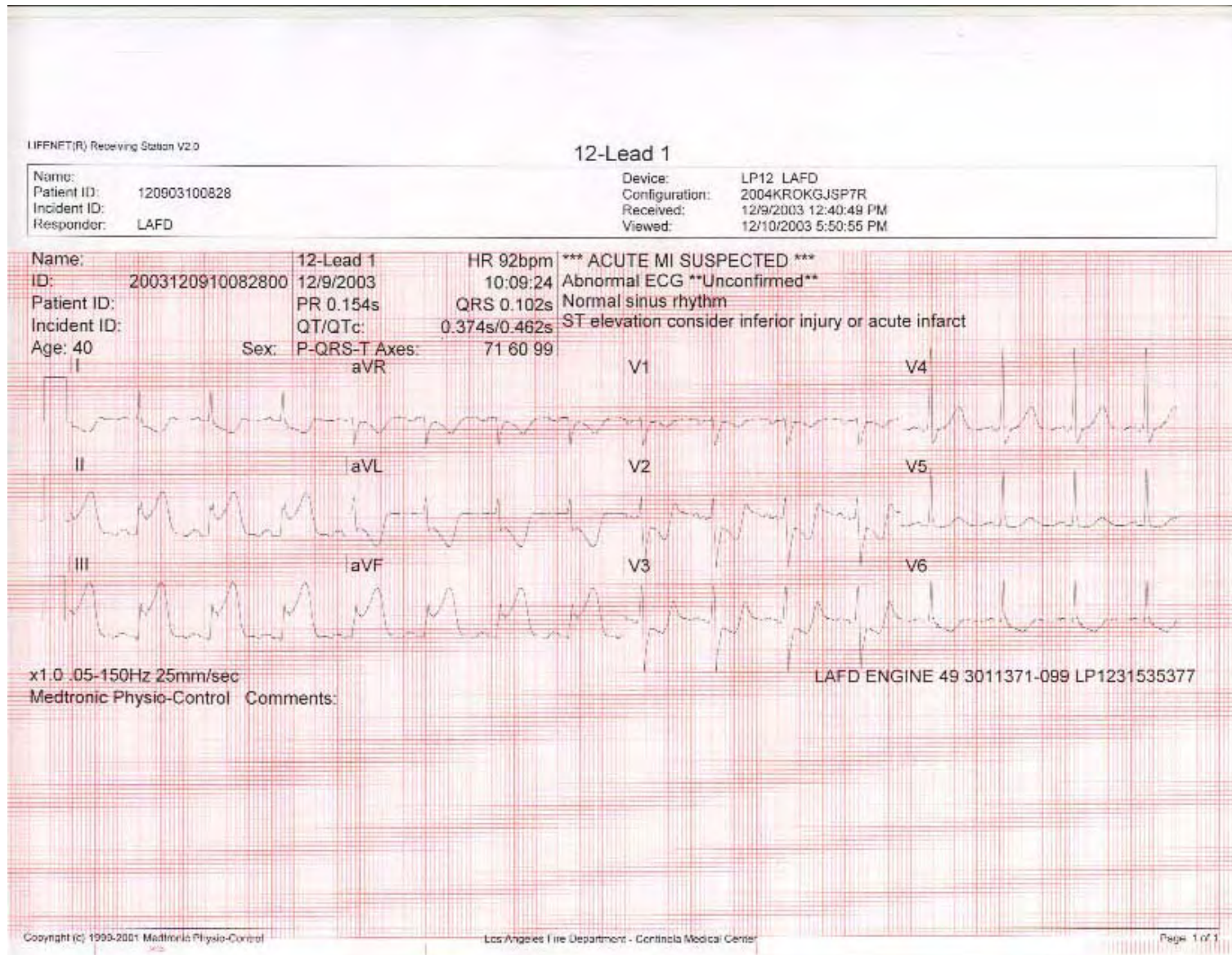
**\*\*\*ACUTE MI\*\*\***

**or**

**\*\*\*ACUTE MI SUSPECTED\*\*\***

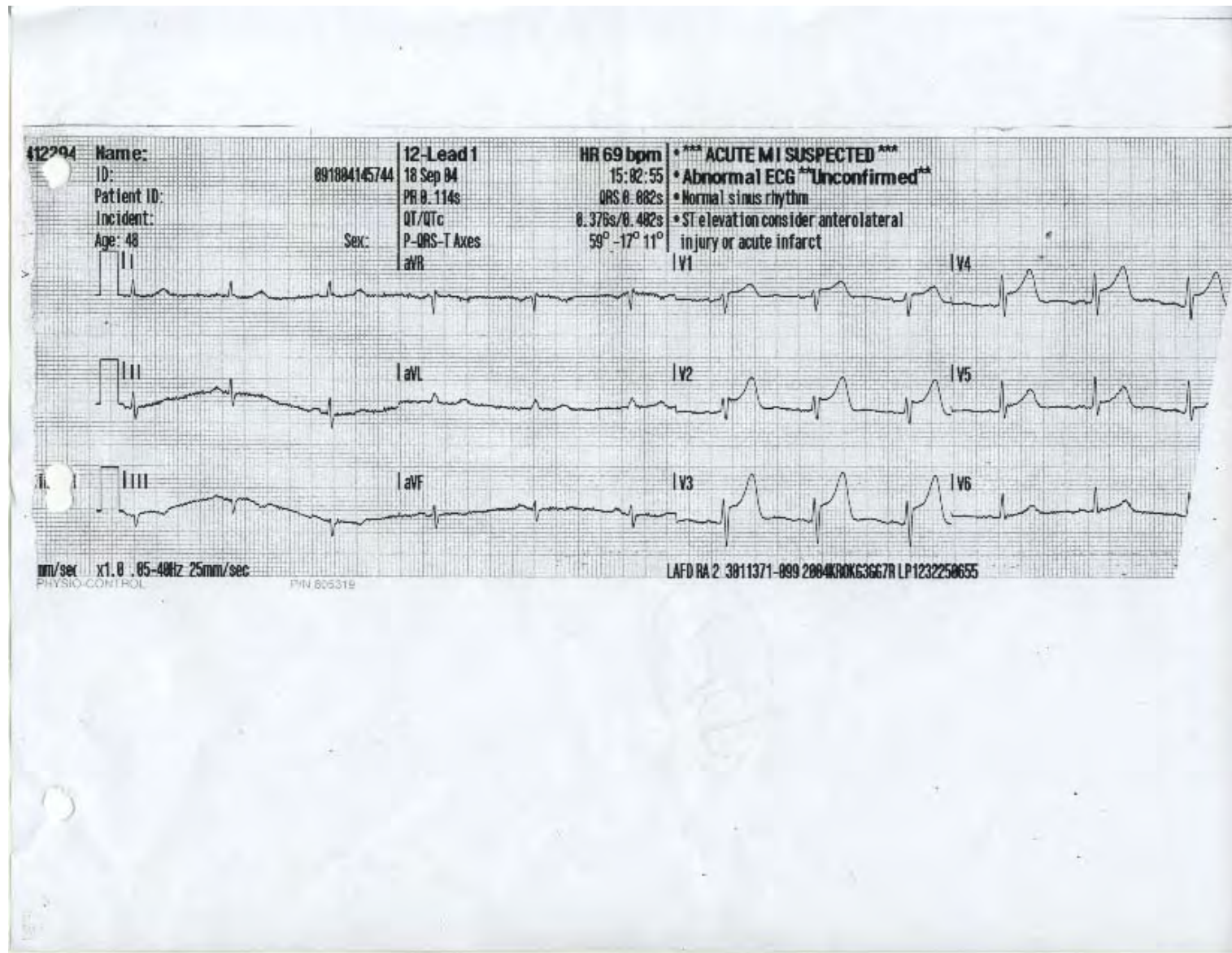
**(or the manufacturer's equivalent)**

# Review of Print Outs



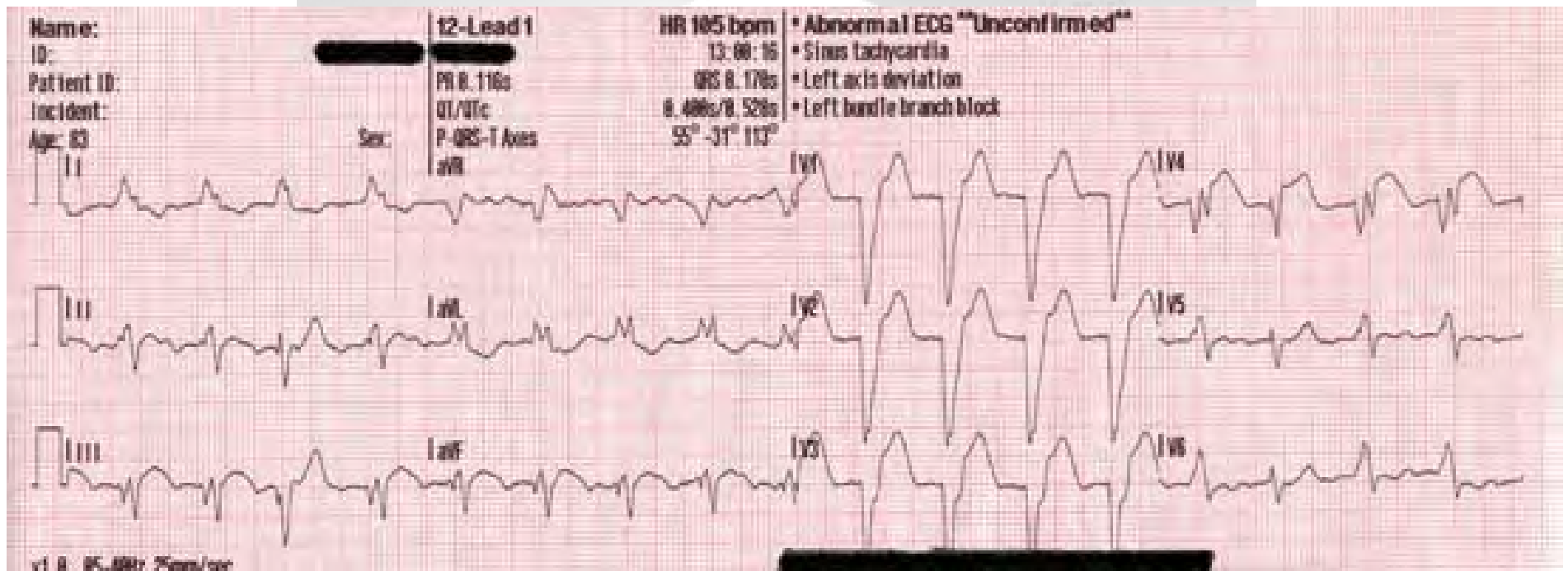


# Review of Print Outs

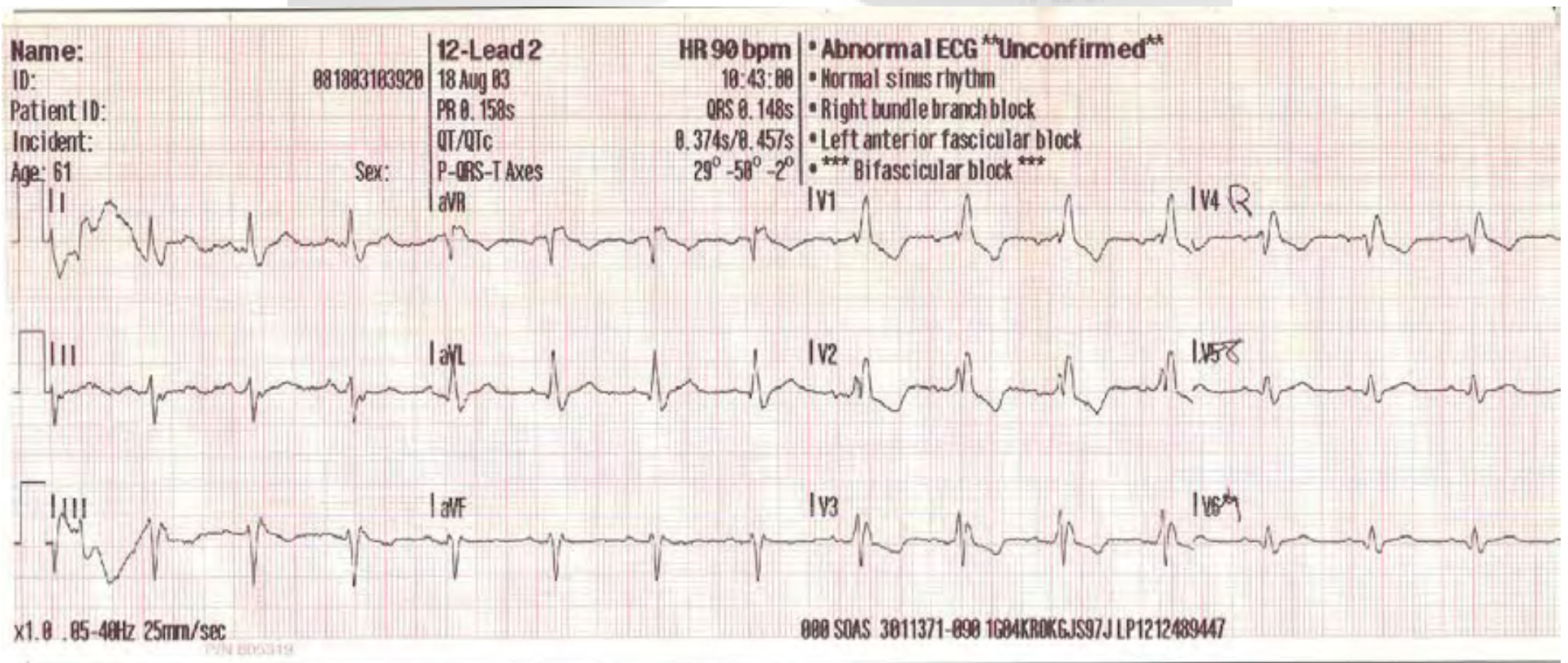




# Review of Print Outs



# Review of Print Outs



# Review of Print Outs

DEVICE ID:ZOLLTEST111  
RECORDED:12:01:51 06 JUL 01  
PATIENT NAME :GARY DENTON  
PATIENT ID# :007  
PATIENT AGE: 45  
PATIENT SEX: Male

Vent. rate 58  
PR interval 142 ms  
QRS Duration: 74 ms  
QT/QTc 418/410 ms  
P-R-T axes 54 57 90

Sinus bradycardia  
Inferior infarct , possibly acute  
Marked ST abnormality, possible anteroseptal subendocardial injury  
\*\* \*\* \* Acute MI \* \*\* \*\*  
Abnormal ECG  
\*\*\* Unconfirmed \*\*\*

# Review of Print Outs

12-lead EKGs other than  
\*\*\*ACUTE MI\*\*\*

Examples of 12-leads that should not be diverted to the SRC:

- “Antero-Lateral MI – Age undetermined”
- “Consider inferior infarct”
- 12-leads interpreted by paramedics as having ST-elevations

# Who Gets a 12-Lead EKG?

- All patients with a chief complaint of chest pain.
  - As part of a complete assessment for a patient with chest pain/discomfort or suspected of having an acute cardiac event.



# 12-Lead EKG

- Important Reminders

- Assess & treat the patient while preparing for the 12-lead EKG (perform on-scene and stop all movement when acquiring)
- Document the Sequence Number on the 12-lead EKG
- Contact the Base Hospital with pertinent patient assessment information and destination
- Report the underlying EKG rhythm and state “the 12-lead reads \*\*\* ACUTE MI SUSPECTED \*\*\*” and any artifact etc., identified
- Don’t interpret or relay “elevated ST segment, infarct etc”

# Form Documentation for STEMI Patients Transported to a SRC

- Document “MI” as the primary chief complaint code followed by the associated code(s) (i.e. CP, SB, SY)
- Mark the destination of SRC (STEMI)
- Mark the box SC Guide

# Data and Tracking

- Paramedics play a vital role with the initial data and tracking of STEMI patients.
- Data and tracking is important for the EMS Agency to determine if the correct care is being given to the patients.



# Notification of SRC and transmission of EKG

- Notification to the SRC will be done by the Base Hospital unless the SRC is the Base Hospital.
- The 12-lead EKG should be transmitted to the SRC, when requested, if capable.

# STEMI Receiving Centers

- Please keep in mind that the SRC has a goal for treating these STEMI patients. We are looking at a “First Medical Contact to Balloon” time of 90 minutes.
- The clock begins with **YOUR** time on the first 12-lead EKG done in the field. Therefore it must be as close to correct as possible.



LOS ANGELES COUNTY  
EMERGENCY MEDICAL SERVICES



ST ELEVATION MYOCARDIAL INFARCTION APPROVED RECEIVING CENTERS

Source: SRC\_013007 Modified on: 013007 File: W:\production\hospital\SRC\_013007A

Effective February 1, 2007





# **SPECIAL THANKS**

- Los Angeles Fire Department
- Los Angeles County Fire Department
- Medtronic / Physio-control Corp.
- UCLA Daniel Freeman Center for Prehospital Care